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EDITOR: JOYCE W. VICKERY

A List of Vascular Plants Occurring in the New England Tablelands, New South Wales, with Notes on Distribution

M. Gray

Introduction

The first census of the vegetation of the New England Region was published by Turner (1903). Further lists of plants from various portions of the New England were published by Cambage (1904 and 1908), in his series " Notes on the Native Flora of N.S.W.," and by Maiden (1906). These lists are now only of historical interest. This is due mainly to the large amount of revisionary work which has been carried out on the flora of New South Wales, the numerous nomenclatural changes which have taken place since the publication of these papers, and to subsequent botanical collecting in the New England Region.

The following list is an attempt to provide botanical workers in the area with a more up-to-date basis for further studies on the flora of this most interesting area. The list should not be regarded as being by any means exhaustive, and future investigations will undoubtedly add considerably to the number of species known to occur in the area.

Delimitation of Area

The area to which the term " New England Tablelands " has been applied in this paper is shown in Fig. I. Turner referred to the New England as lying " between the parallels 29° and 31° South, and the meridians 151° 20′ and 152° 20′ East." The boundary given in the present paper is an attempt to more accurately delimit the area covered by the tableland flora, as distinct from that of the scarp and coastal areas to the east, and the slopes and plains to the west. It is realised, however, that any such boundary will of necessity be somewhat arbitrary.

The eastern boundary is fairly well defined by a more or less distinct, and often very abrupt, scarp edge which separates the tablelands from the adjoining coastal area. The western boundary, however, is less well defined, especially in the north-western portion of the area, and here only one of several possible alternatives has been taken. The northern boundary where the N.S.W.-Queensland border has been followed is almost entirely artificial.

For convenience in discussion, the region has been divided into two sections, namely " eastern half " and " western half ". The approximate dividing line between these sections can be taken as being the main railway line from Wallangarra to Woolbrook.

Discontinuous areas of Montane Temperate and Sub-Montane Rain Forests are to be found along the easternmost edge of the area, e.g. at Point Lookout (dominated by *Nothofagus moorei*), and on the Gibraltar Range (dominated by *Ceratopetalum apetalum*). Although Turner included Rain Forest species in his list, plants which are restricted to these formations are not included in the present list. It is felt that more extensive collections are required before an adequate list of the species occurring in these communities can be compiled.

Arrangement

The system of classification of Engler and Gilg (1924) has been used with the following exceptions: Ferns—Copeland 1947; Monocotyledons—Hutchinson 1934. For the sake of convenience, the genera and species have been listed in alphabetical order, and an index to families is given on page 80. Relevant synonyms and names incorrectly applied by Australian authors are given in brackets following the currently accepted specific name. References to the literature are given under the Genera and Species concerned, and wherever possible at least one herbarium has been indicated where representative specimens from the New England can be located; these annotations however are by no means comprehensive. The numbers following the abbreviations " NES " refer to collecting numbers of the author.

List of Abbreviations

The following abbreviations are used in this paper:—

BRI	The Botanical Museum and Herbarium, Brisbane, Queensland.
CANB	Herbarium of the Division of Plant Industry, C.S.I.R.O., Canberra, Australian Capital Territory.
CSA	Herbarium of the Regional Pastoral Laboratory, C.S.I.R.O., Armidale, New South Wales.
JB	Herbarium of Mr. J. Begg, at present located at C.S.I.R.O., Regional Pastoral Laboratory, Armidale, New South Wales.
NES	Herbarium of the New England Ecological Survey, at present located at C.S.I.R.O., Canberra, Australian Capital Territory.
†NEU	Herbarium of the New England University, Armidale, New South Wales.
NSW	National Herbarium, Sydney, New South Wales.
*	Naturalised plant.

Acknowledgments

The field collections on which this list is based were made during the period 1951 to 1954 inclusive while the author was employed as an assistant to Mr. R. W. Jessup of the C.S.I.R.O. during the course of an ecological survey of the New England Region. The author is indebted to him for much encouragement and assistance, and also for the use of data and maps, as yet unpublished.

The author also wishes to thank the Director, Mr. R. H. Anderson, for permission to use the facilities and collections of the National Herbarium of New South Wales on numerous occasions. Thanks are particularly due to the members of the Staff of that institution for their most courteous and generous assistance with the botanical determinations associated with the project; however, except where indicated, the responsibility for the nomenclature used and opinions expressed in the paper rests solely with the author.

Grateful thanks are also due to Dr. G. L. Davis of the University of New England for much encouragement, and permission to study the collections of the University herbarium; to Associate Professor R. Roe and Dr. N. T. Burbidge of the C.S.I.R.O. for encouragement and assistance, and to Dr. S. T. Blake of the Brisbane Herbarium who kindly identified some of the Cyperaceae.

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† The collections referred to in this herbarium were destroyed by fire on 23. ii. 1958.

PTERIDOPHYTA

SELAGINELLACEAE

Selaginella *Beauv.*

S. uliginosa (*Labill.*) *Spring.* Jennings to Boonoo Boonoo, near swampy area in hilly granite country. NES 3741.

PSILOTACEAE

Psilotum *Sw.*

P. nudum (*L.*) *Griseb.* (*P. triquetrum* Sw.). Near Armidale Pine Forest; Turner records this species from E. of Stonehenge; rare. NES 2006.

OPHIOGLOSSACEAE

Ophioglossum *L.*

O. coriaceum *A. Cunn.* Dumaresq; Chiswick, 10 miles S of Armidale; very sparse. NES 1797.

OSMUNDACEAE

Todea *Willd.*

T. barbara (*L.*) *Moore.* (*Osmunda barbara* (L.) Thunb.). Pt. Lookout. NEU.

GLEICHENIACEAE

Gleichenia *Sm.*

G. dicarpa *R.Br.* Doughboy Range, Ebor area. NES 1885 etc.

PTERIDACEAE

Adiantum *L.*

A. aethiopicum *L.* Widespread but of sparse occurrence. NES 2876.

A. hispidulum *Sw.* Granite ranges NE of Tenterfield. NES 2464.

Cheilanthes *Sw.*

C. distans (*R.Br.*) *Mett.* (*Notholaena distans* R.Br.). Fairly common. NES 1078.

C. tenuifolia (*Burm. f.*) *Sw.* Widespread and common. NES 1919.

Culcita *Presl*

C. dubia (*R.Br.*) *Maxon.* (*Davallia dubia* R.Br.). Fairly common on granite ranges in the eastern half of the area. NES 2612 etc.

Dicksonia *L'Hér.*

D. antarctica *Labill.* (*D. billardieri* (Kaulf.) F. Muell.). Fairly common on mountain ranges on the eastern edge of the area. NES 2002; NEU.

Doryopteris *J.Sm.*

D. concolor (*Langsd. and Fisch.*) *Kuhn.* (*Pteris concolor* Langsd. and Fisch; *Pteris geraniifolia* Raddi.). Turner records this species from Black Swamp.

Hypolepis *Bernh.*

H. punctata (*Thunb.*) *Mett.* (*Polypodium punctatum* Thunb.). Stannum to Torrington. (Cambage 1908.)

Lindsaea *Dryand.*

L. linearis *Sw.* Vicinity Little Mt. Spirabo. NES 2665.

L. microphylla *Sw.* Turner records this species from Armidale Gully.

Pellaea *Link.*

P. falcata (*R.Br.*) Fée. (*Pteris falcata R.Br.*). Yarrowyck area. NES 2100.

P. paradoxa (*R.Br.*) *Hook.* (*Pteris paradoxa* (R.Br.) Desv.). Vicinity of Armidale Pine Forest. NES 2662 etc.

Pteridium *Gleditsch ex Scopoli*

P. esculentum (*Forst. f.*) *Nakai.* (*P. aquilinum* (L.) Kuhn, var. *esculentum* (Forst. f.) Kuhn.). Widespread and common. NES 2605.

Pteris *L.*

P. tremula *R.Br.* (*P. arguta* F. Muell., non Ait.). Dangar's Falls. NES 1654.

DAVALLIACEAE

Davallia *Sm.*

D. pyxidata *Cav.* Fairly widespread but of sparse occurrence. NES 2663 etc.

CYATHEACEAE

Cyathea *Sm.* (See Tindale 1956.)

C. australis (*R.Br.*) *Domin.* (*Alsophila australis* R.Br.). Fairly common on mountain ranges on the eastern edge of the area.

ASPIDIACEAE

Cyclosorus *Link*

C. parasiticus (*L.*) *Farw.* Blue Hole 9 miles SE of Armidale. NEU.

Lastreopsis *Ching.* (See Tindale 1957.)

L. microsora (*Endl.*) *Tindale.* Gibraltar Range, 40 miles NE of Glen Innes. NES 3085 etc.

Polystichum *Roth*

P. fallax *Tindale.* Wallangarra. (Tindale 1955.)

BLECHNACEAE

Blechnum *L.*

B. cartilagineum *Sw.* Fairly common on eastern ranges. NES 2614.

B. minus (*R.Br.*) *Ettingsh.* (*B. capense* auctt. austr. non Schlecht.). Tenterfield to Boonoo Boonoo; Doughboy Range, Ebor area. NES 1963, 3750.

B. nudum (*Labill.*) *Mett. ex Luerss.* Major's Creek near Ebor. This species is also found in *Nothofagus* forest at Point Lookout. NEU.

B. penna-marina (*Poir.*) *Kuhn.* Tenterfield. NEU.

B. procerum (*Forst. f.*) *Sw.* Gibraltar Range, 40 miles NE of Glen Innes. NES 3238.

Doodia *R.Br.*

D. aspera *R.Br.* (*Woodwardia aspera* (R.Br.) Fée.). Fairly widespread but of sparse occurrence. NES 2721 etc; NEU.

D. caudata (*Cav.*) *R.Br.* (*Woodwardia caudata* Cav.). Bolivia; Dangars Falls; Blue Hole, 9 miles SE of Armidale. NSW; NEU.

ASPLENIACEAE

Asplenium *L.*

A. falcatum *Lam.* Gibraltar Range, 40 miles NE of Glen Innes. NES 3237.

A. flabellifolium *Cav.* Widespread, but of sparse occurrence. NES 2294 etc.; NEU.

A. flaccidum *Forst. f.* SE of Yarrowitch. NSW.

Pleurosorus *Fée*

P. subglandulosus (*Hook. et Grev.*) *Tindale.* Wallangarra. (Tindale 1957.)

POLYPODIACEAE

Pyrrosia *Mirbel*

P. confluens (*R.Br.*) *Ching.* (*Polypodium confluens* R.Br.; *Cyclophorus confluens* (R.Br.) C.Chr.). Wollomombi Falls. NES 2514.

P. rupestris (*R.Br.*) *Ching.* (*Polypodium serpens* auct.; *Cyclophorus serpens* auct.). Ebor Falls. NES 1998.

MARSILEACEAE

Marsilea *L.*

M. hirsuta *R.Br.* Gara River, E of Armidale; Guyra area. NES 2265 NSW.

SALVINIACEAE

Azolla *Lam.*

A. filiculoides *Lam.* var. **rubra** (*R.Br.*) *Strasburger.* (*A. rubra* R.Br.). Ebor area. NES 1992.

GYMNOSPERMAE

ZAMIACEAE

Macrozamia *Miq.* (See Johnson 1959.)

M. pauli-guilielmi *W. Hill et F. Muell.* ssp. **plurinervia** *L. Johnson.* Tingha area, not common. NES 1672.

CUPRESSACEAE

Callitris *Vent.* (See Garden 1957.)

C. endlicheri (*Parl.*) *F. M. Bail.* (*C. calcarata* (A. Cunn. ex Mirb.) F. Muell., nom. illegit.). 2 miles W of Amosfield; Jennings area; Silent Grove, N of Torrington; Bolivia; Torrington; Tent Hill to Torrington; Ashford area; Emmaville area; Inverell area; Howell; Backwater; Head of Apsley Falls; Tia Falls; Walcha area; widespread and fairly common on hilly granite and porphyry country throughout the area. NES 2394 etc.; NSW.

C. hugelii (*Carr.*) *Franco.* (*C. glauca* R.Br. ex R. T. Baker et H. G. Sm., nom. illegit.). Arthur's Seat, S of Ashford; Inverell area; Moonbi Range; this species is common in the western slopes area which adjoins the western edge of the New England Tablelands. NSW.

C. monticola *J. Garden.* Wallangarra area, granite hills; 40 miles E of Glen Innes. NSW.

C. oblonga *A. et L. C. Rich.* Sandy Creek, Wollomombi to Guy Fawkes; Pheasant Mountain, Backwater area. It has also been collected from Marengo Falls, E of the New England Tablelands. NES 3467; NSW.

C. rhomboidea *R.Br. ex A. et L.C. Rich.* (*C. cupressiformis* G. Don.). Tenterfield; Cataract River, E of Tenterfield. NES 3467; NSW.

ANGIOSPERMAE

MONOCOTYLEDONAE

HYDROCHARITACEAE

Ottelia *Pers.*

O. ovalifolia (*R.Br.*) *L. C. Rich.* Glen Innes to Deepwater; Blue Hole; on the edges of small dams, lagoons and swamps. NES 3427; NEU.

Vallisneria *L.*

V. spiralis *L.* Common in the larger lagoons e.g. Uralla Lagoon etc. NEU.

ALISMATACEAE

Alisma *L.*

A. plantago-aquatica *L.* Blue Hole, 9 miles SE of Armidale; Gara River, Armidale to Wollomombi; Rocky Gully, Uralla to Bendemeer; found in swamps, dams and the backwaters of slow-flowing streams. NES 3170 etc; NEU.

Damasonium *Mill.*

D. minus (*R.Br.*) *Buchen.* Blue Hole, 9 miles SE of Armidale; Glen Innes area; Uralla area; similar habitats to *Alisma plantago-aquatica.* NES 3850; NSW; NEU.

JUNCAGINACEAE

Triglochin *L.*

T. procera *R.Br.* Tenterfield; Glen Innes; Limestone Creek; Longford; Blue Hole; Gara River, E of Armidale; fairly widespread, in slow-moving creeks throughout the area. NES 2843; NEU; NSW.

POTAMOGETONACEAE

Potamogeton *L.*

P. crispus *L.* Guyra area; Tia River, Walcha area; partly submerged in streams. NSW.

P. ochreatus *Raoul.* Guyra area; Rimbanda and Tia areas; partly submerged in streams. NES 2301; NSW.

P. perfoliatus *L.* Wellingrove Creek; Blue Hole, 9 miles E of Armidale; Tia River; partly submerged in streams. NES 1914; NSW; NEU.

P. tricarinatus *F. Muell. et A. Benn.* Deepwater; Glen Innes area; Moredun Creek; Parlour Mts., Booroolong area; Blue Hole, 9 miles E of Armidale; Walcha and Tia areas; partly submerged in streams. NSW; NEU.

COMMELINACEAE

Aneilema *R.Br.*

A. acuminatum *R.Br.* Tenterfield to Sandy Flat; Clifton, W of Tenterfield. NSW.

A. biflorum *R.Br.* Demon's Creek, New England. NSW.

Commelina *L.*

C. cyanea *R.Br.* Yarrowyck area. NES 2703 etc.

Murdannia *Royle*

M. graminea (*R.Br.*) *Brückn.* (*Aneilema gramineum* R.Br.; *Phaeneilema gramineum* (R.Br.) Brückn.). Uralla to Rocky Gully, valley in granite country; Chiswick, 10 miles S of Armidale; Turner records the species from Sandy Flat; not common. NES 2269; CANB.

XYRIDACEAE

Xyris *L.* (See Malme 1927.)

X. gracilis *R.Br.* N of Wellingrove; Turner records this species from Graham's Valley. NES 2728.

X. operculata *Labill.* Gibraltar Range. NES 3077.

ERIOCAULACEAE

Eriocaulon *L.* (See Ruhland 1903.)

E. scariosum *Sm. non R.Br.* (*E. smithii* R.Br.). Doughboy Range; Glen Elgin to Dundee; swampy areas in hilly granite country. NES 1886; NEU.

LILIACEAE

Anguillaria *R.Br.*

A. dioica *R.Br.* (*Wurmbea dioica* (R.Br.) F. Muell.). Fairly widespread and fairly common. NES 2209 etc.

Arthropodium *R.Br.*

A. milleflorum (*Red.*) *Macbride.* (*A. paniculatum* (Kennedy) R.Br.). Fairly widespread but of sparse occurrence. NES 2366 etc.

A. minus *R.Br.* Yarrowyck area. NES 2262.

Blandfordia *Sm.*

B. grandiflora *R.Br.* (*B. flammea* Lindl.). Glen Elgin; Gibraltar Range. NES 3050; NSW.

Bulbine *L.*

B. bulbosa (*R.Br.*) *Haw.* (*Bulbinopsis bulbosa* (R.Br.) Borzi.). Fairly widespread but of sparse occurrence. NES 2237.

Caesia *R.Br.*

C. vittata *R.Br.* Stonehenge; Ben Lomond. NSW.

Dianella *Lam.* (See Curtis 1952.)

D. caerulea *Sims.* Generally in montane granite areas, fairly widespread but of sparse occurrence. NES 2171 etc.

D. laevis *R.Br.* Tingha area; Glen Innes to Deepwater. NES 2370.

Dichopogon *Kunth*

D. fimbriatus (*R.Br.*) *Macbride.* (*D. sieberianus* Kunth). Fairly widespread but of somewhat sparse occurrence. NES 2242 etc.

D. strictus (*R.Br.*) *J. G. Bak.* (*Arthropodium strictum* R.Br.). Armidale, University Grounds. NEU.

Laxmannia *R.Br.*

L. gracilis *R.Br.* (*Bartlingia gracilis* (R.Br.) F. Muell.). Tingha and Ashford areas. NES 2499 etc.

Stypandra *R.Br.*

S. glauca *R.Br.* Torrington; Tingha; Howell; Wellingrove; Yarrowyck; generally on the rocky slopes of granite and porphyry hills. NES 2162 etc. (Cambage 1904, 1908.)

Thysanotus *R.Br.*

T. tuberosus *R.Br.* Fairly widespread but of sparse occurrence. NSW.

Tricoryne *R.Br.*

T. elatior *R.Br.* Widespread and fairly common. NES 2160 etc.

SMILACACEAE

Smilax *L.*

S. australis *R.Br.* Yarrow Creek. NES 2610.

PHILESIACEAE

Eustrephus *R.Br.*

E. latifolius *R.Br.* var. **angustifolius** (*R.Br.*) *Benth.* Mole River, 7 miles N of Silent Grove; Guyra. NSW.

Geitonoplesium *A. Cunn. ex Hook.*

G. cymosum (*R.Br.*) *A. Cunn. ex Hook.* Fairly widespread, but of sparse occurrence. Generally found on rocky outcrops in hilly granite country. NES 2333 etc.

ARACEAE

Typhonium *Schott.*

T. brownii *Schott.* Styx River, Jeogla area; rare. CANB.

LEMNACEAE

Lemna *L.*

L. minor *L.* Turner records this species from Yarrowyck.

L. trisulca *L.* Ebor Falls; The Pinch, S of Guyra. NSW; NEU.

SPARGANIACEAE

Sparganium *L.*

S. antipodum *Graebn.* Glen Elgin to Dundee, swamp in hilly granite country; Ebor Falls; Walcha area. NES 3832; NSW; NEU.

TYPHACEAE

Typha *L.* (See Melvaine 1940.)

T. muelleri *Rohrbach.* Vicinity Twin Mountains, W of Dundee. NES 1936.

IRIDACEAE

Patersonia *R.Br.*

P. glabrata *R.Br.* Doughboy Range, Ebor area. NES 2919.

P. glauca *R.Br.* Doughboy Range, Ebor area. NES 2906.

P. sericea *R.Br.* Parlour Mountains, Booroolong area; Longford area. NES 1814 etc.

Sisyrinchium *L.*

***S. micranthum** *L.* Chiswick, 10 miles S of Armidale. NEU.

XANTHORRHOEACEAE

Lomandra *Labill.*

L. filiformis (*Thunb.*) *J. Britten* sens. lat. Very variable; widespread and fairly common. NES 2455 etc.

L. glauca (*R.Br.*) *Ewart.* Doughboy Range, Ebor area. NES 2921.

L. leucocephala (*R.Br.*) *Ewart.* Ingledale, Bundarra area. CSA.

L. longifolia *Labill.* (*Xerotes longifolia* (Labill.) R.Br.). Widespread and fairly common; somewhat variable. NES 2079 etc.

L. multiflora (*R.Br.*) *J. Britten.* (*Xerotes multiflora* R.Br.; *Xerotes brownii* F. Muell.). Widespread and common. NES 2206 etc.

Xanthorrhoea *Sm.*

The species of *Xanthorrhoea* in the area were not dealt with during the survey.

HAEMODORACEAE

Haemodorum *Sm.*

H. planifolium *R.Br.* Torrington; Howell. NES 63. (Maiden 1906.)

HYPOXIDACEAE

Hypoxis *L.*

H. hygrometrica *Labill.* Widespread and fairly common, generally in damp situations. NES 2302.

PHILYDRACEAE

Philydrum *Banks ex Gaertn.*

P. lanuginosum *Gaertn.* Jennings area, growing in 6 inches of water in small dam. NES 3725.

BURMANNIACEAE

Burmannia *L.*

B. disticha *L.* Lottery Creek, Torrington area. NSW.

ORCHIDACEAE

Bulbophyllum *Thou.* (See Hunt and Rupp 1948.)

B. elisae (*F. Muell.*) *Benth.* 19 miles E of Glen Innes on Grafton road; Tenterfield to Boonoo Boonoo; grows in thick moss on large granite boulders, in hilly granite country on the eastern edge of the area. NES 2397.

Caladenia *R.Br.*

C. angustata *Lindl.* Guyra; rare. (Rupp, 1943.)

C. caerulea *R.Br.* Wallangra, Inverell area. NSW. (Rupp, 1943.)

C. carnea *R.Br.* Fairly widespread, but of very sparse occurrence. NES 2081. (Rupp, 1943.)

C. dilatata *R.Br.* Guyra; rare. (Rupp 1943.)

Caleana *R.Br.*

C. major *R.Br.* Doughboy Range, Armidale to Ebor; growing in *Eucalyptus radiata—E. acaciiformis* association on granite range. Rare. NES 2912.

C. minor *R.Br.* Torrington. (Rupp 1943.)

Calochilus *R.Br.*

C. campestris *R.Br.* Tenterfield; Parlour Mts., Booroolong area. NES 1827. (Rupp 1943.)

Chiloglottis *R.Br.*

C. gunnii *Lindl.* Round Mountain, Guy Fawkes area. (Rupp 1943).

C. reflexa (*Labill.*) *Druce.* Turnoff to Pt. Lookout on Armidale-Ebor road, granite range country; rare. NES 3129. (Rupp 1943.)

Cryptostylis *R.Br.*

C. leptochila *F. Muell. ex Benth.* Yaroonah (or Yooroonah), app. 14 miles E of Wollomombi. (Rupp 1943.)

Cymbidium *Sw.*

C. canaliculatum *R.Br.* 20 miles N of Torrington, epiphyte on *Eucalyptus caleyi;* 4 miles W of Ashford, epiphyte on *Alphitonia excelsa.* NES 51 etc.

Dendrobium *Sw.*

D. cucumerinum *Macleay.* Walcha; also observed as an epiphyte on *Casuarina cunninghamiana* on the banks of the Bluff River, New England Highway 15 miles S of Tenterfield; rare. (Rupp 1943.)

D. kingianum *Bidw.* Bolivia. (Rupp 1943.)

D. linguiforme *Sw.* Emmaville; also observed growing in thick moss on rocks at the top of Wollomombi gorge. (Rupp 1943.)

D. pugioniforme *A. Cunn.* 7 miles NE of Tenterfield; Ebor Falls. NES 2468; NEU.

Dipodium *R.Br.*

D. hamiltonianum *F. M. Bail.* Howell; Emmaville; Barn Gully, Guyra district. (Rupp 1943.)

D. punctatum (*Sm.*) *R.Br.* Fairly widespread, but of sparse occurrence in the area. NES 69 etc. (Rupp 1943.)

Diuris *Sm.*

D. abbreviata *F. Muell. ex Benth.* Armidale; Walcha; Emmaville; Guy Fawkes; Guyra district; Ebor; Parlour Mountains, Booroolong area; 9 miles W of Yarrowyck; fairly widespread but of sparse occurrence. NES 1826 etc. (Rupp 1943.)

D. alba *R.Br.* Wollomombi Station; Turner records the species from Salisbury Plains; rare. NES 3112.

D. aurea *Sm.* Ashford; Bismuth; Turner records the species from Graham's Valley. (Rupp 1943.)

D. bracteata *Fitz.* Torrington; rare. (Rupp 1943.)

D. pallens *Benth.* Walcha; Guyra. (Rupp 1943.)

D. pedunculata *R.Br.* Torrington; Guyra. (Rupp 1943.)

D. punctata *Sm.* (*D. elongata* Sw.) Armidale; Tingha; Wallangarra; Guyra; Ben Lomond; 7 miles W of Yarrowyck; fairly widespread but of sparse occurrence. According to Rupp a yellow-flowered form occurs in the Guyra area, and a form with petaloid sepals in the Ben Lomond area. NES 2331 etc. (Rupp 1943.)

D. punctata *Sm.* var. **minor** *Benth.* 4½ miles W of Tingha, growing in *Eucalyptus tinghaensis* association on soil derived from granite; rare. NES 2364.

D. rhomboidalis *Rupp.* Torrington. (Rupp 1943.)

Eriochilus *R.Br.*

E. cucullatus (*Labill.*) *Reichb. f.* (*E. autumnalis* R.Br.). Armidale; Chiswick, 10 miles S of Armidale; Castle Doyle etc.; fairly widespread in the area, but of somewhat sparse occurrence. NES 199. (Rupp 1943.)

Galeola *Lour.*

G. cassythoides (*A. Cunn.*) *Reichb. f.* Tenterfield. (Rupp 1943.)

Gastrodia *R.Br.*

G. sesamoides *R.Br.* Walcha; Clifton, W of Tenterfield; Niangala. (Rupp 1943.)

Glossodia *R.Br.*

G. major *R.Br.* Fairly widespread, and fairly common. NES 2080. (Rupp 1943.)

Lyperanthus *R.Br.*

L. suaveolens *R.Br.* (*Caladenia suaveolens* (R.Br.) Reichb. f.). Parlour Mountains, Booroolong area; rare. NES 161.

Microtis *R.Br.*

M. parviflora *R.Br.* Bolivia; Turner records the species from Salisbury Plains. (Rupp 1943.)

M. unifolia (*Forst.*) *Reichb. f.* (*M. porrifolia* (Sw.) R.Br.). Uralla area; Toryburn area. NES 2318 etc.

Orthoceras *R.Br.*

O. strictum *R.Br.* Bullock Creek, Pt. Lookout area. NEU.

Prasophyllum *R.Br.* (See Rupp 1948.)

P. brevilabre *Hook. f.* Niangala. (Rupp 1943.)

P. odoratum *Rogers.* Wallangarra; Jennings; Round Mountain; Guyra; Niangala. (Rupp 1943.)

P. patens *R.Br.* Glen Innes. (Rupp 1943.)

Pterostylis *R.Br.*

P. alpina *Rogers.* Point Lookout. (Rupp 1953.)

P. coccinea *Fitz.* Serpentine River. (Rupp 1943.)

P. decurva *Rogers.* Vicinity of Little Mt. Spirabo; Ebor. NES 2769 etc. (Rupp 1943.)

P. longifolia *R.Br.* Top of Spirabo Range, vicinity of Little Mt. Spirabo; 14 miles NE of Glencoe, on Yarrow Creek road. NES 2763 etc.

P. mutica *R.Br.* Fairly widespread and fairly common. NES 2261 etc; (Rupp 1943.)

P. nutans *R.Br.* Wallangarra; vicinity of Little Mt. Spirabo. NES 2749. (Rupp 1943.)

P. obtusa *R.Br.* 9 miles N of Glen Innes, *Eucalyptus laevopinea* assoc.; 14 miles NE of Glencoe on Yarrow Creek road, *Eucalyptus obliqua—E. cameronii* assoc. NES 2606 etc.

P. pusilla *Rogers.* Glen Innes; Guyra. (Rupp 1943.)

P. pusilla *Rogers* var. **prominens** *Rupp.* Guyra. (Rupp 1943.)

P. reflexa *R.Br.* Guyra. (Rupp 1943.)

P. rufa *R.Br.* 1.7 miles W of Yarrowyck; Turner records the species from Ranger's Valley. NES 2099. (Rupp 1943.)

P. truncata *Fitz.* Hillgrove. (Rupp 1943.)

P. woollsii *Fitz.* Pine Forest near Armidale. NEU.

Sarcochilus *R.Br.* (See Rupp 1951.)

S. ceciliae *F. Muell.* Hillgrove; Wollomombi. (Rupp 1943.)

Spiranthes *Rich.*

S. sinensis (*Pers.*) *Ames.* (*S. australis* (R.Br.) Lindl.). Fairly widespread, and fairly common in swampy areas in granite country. NES 2725.

Thelymitra *Forst.*

T. aristata *Lindl.* Guyra. (Rupp 1943.)

T. ixioides *Sw.* Parlour Mountains, Booroolong area; Doughboy Range, Armidale to Ebor; Guy Fawkes; Deepwater; grows on either granite or porphyry mountains in the area. NES 3113 etc. (Rupp 1943.)

T. media *R.Br.* Torrington. (Rupp 1943.)

T. nuda *R.Br.* Guyra. (Rupp 1943.)

JUNCACEAE

Juncus *L.* (See Buchenau 1906.)

***J. articulatus** *L.* (*J. lampocarpus* Ehrh.). Armidale area. NES 2043.

J. australis *Hook. f.* Fairly widespread and fairly common. NES 2726.

J. bufonius *L.* Widespread and common. NES 2203; NEU.

***J. capitatus** *Weig.* Yarrowyck area. NES 2188.

J. filicaulis *Buchen.* Widespread and common. NES 2042 etc.

J. fockei *Buchen.* Guyra area; Guyra Lagoon; Parlour Mtns., Booroolong area; Ebor Falls. NES 3164; JB.

J. homalocaulis *F. Muell. ex Benth.* (*J. plebeius* (auct. austr., non R.Br.). Widespread and fairly common. NES 2197; NEU.

J. planifolius *R.Br.* Jennings to Boonoo Boonoo; Wilson's Downfall; Bolivia; Wollomombi, near dog gate; hilly granite country. NES 3742; NSW; NEU.

J. polyanthemus *Buchen.* Fairly widespread and fairly common, e.g. Thomas's Lagoon, SW of Armidale; Gibraltar Range, NE of Glen Innes etc. According to Mr. L. A. S. Johnson, this species hybridises extensively with *J. australis.* NES 3080; NEU.

J. prismatocarpus *R.Br.* Glen Elgin; Parlour Mtns., Booroolong area; Doughboy Range; Uralla area; on the edges of creeks and dams. NES 1888; NEU; JB.

J. subsecundus *N. A. Wakefield.* Widespread and fairly common. NSW.

***J. tenuis** *Willd.* Dirty Creek, Armidale to Ebor. NSW; NEU.

J. vaginatus *R.Br.* Widespread and fairly common, e.g. Vicinity of Armidale township; 10 miles N of Armidale etc. NES 2040 etc.

The section "*Junci genuini*" is at present being revised by Mr. L. A. S. Johnson of the National Herbarium of N.S.W. Mr. Johnson considers that there are three undescribed species belonging to this section in the area.

Luzula *DC.*

L. campestris (*L.*) *DC.* sens. lat. Widespread and common. NES 1791 etc.

CENTROLEPIDACEAE

Centrolepis *Labill.*

C. fascicularis *Labill.* Doughboy Range, Ebor area; Jennings to Boonoo Boonoo; swampy areas in hilly granite country. NES 2975 etc.

RESTIONACEAE

Calorophus *Labill.*

C. lateriflorus (*R.Br.*) *F. Muell.* (*Hypolaena lateriflora* R.Br.) Sandy Creek, Armidale-Grafton road; Bullock Creek, Point Lookout area. NEU.

Lepyrodia *R.Br.*

L. anarthria *F. Muell. ex Benth.* Doughboy Range, Ebor Area. NES 2656 etc; NEU.

L. muelleri *Benth.* Gilgai, S of Inverell. NES 2356.

L. scariosa *R.Br.* Gibraltar Range, 40 miles NE of Glen Innes. NES 3232.

Restio *L.*

Restio sp. aff. **R. australis** *R.Br.* Gibraltar Range ; Parlour Mtns., Booroolong area; Doughboy Range. NES 2657 etc; NEU.

CYPERACEAE

Bulbostylis *Kunth*

Bulbostylis sp. Moredun Creek, swampy area in porphyry hill country; Bolivia. NES 3255; NSW.

Carex *L.* (See Nelmes 1944.)

C. appressa *R.Br.* (*C. paniculata* Benth., non L.). Widespread and fairly common in damp situations near lagoons etc. NES 2116 etc.

C. breviculmis *R.Br.* Chiswick, 10 miles S of Armidale; Walcha district. NES 2962; CANB.

C. echinata *Murr.* (*C. stellulata* Gooden.). Major's Ck., Ebor area; Guy Fawkes. NSW; NEU.

C. fascicularis *Soland. ex Boott.* (*C. pseudocyperus* Benth., non L.). Glen Elgin; Turner records this species from Walcha. CANB.

C. gaudichaudiana *Kunth.* (*C. vulgaris* Fries., var. *gaudichaudiana* (Kunth) Boott; Includes *C. contracta* F. Muell.). Widespread and fairly common, on stream banks. NES 2114 etc.

C. inversa *R.Br.* Widespread and very common. NES 1784 etc.

C. lobolepis *F. Muell.* (*C. cernua* var. *lobolepis* (F. Muell.) Kükenth.). Murson Creek, Boonoo Boonoo to Wilson's Downfall; Point Lookout. NES 3758; NEU.

C. polyantha *F. Muell.* (*C. acuta* Benth., non L.). Inverell; Walcha; Tia. NSW.

C. tereticaulis *F. Muell.* Guyra Lagoon; Uralla Lagoon. NEU.

Caustis *R.Br.* (See Pfeiffer 1925.)

C. flexuosa *R.Br.* Fairly widespread in hilly granite and porphyry country throughout the area. NES 2851 etc.

Cyperus *L.* (See Kükenthal 1936.)

C. brevifolius (*Rottb.*) *Hassk.* (*Kyllinga brevifolia* Rottb.). Yarrowyck area; 8 miles E of Wollomombi on Kempsey road. NES 2193 etc.

C. concinnus *R.Br.* Armidale to Wollomombi. NES 1853.

C. difformis *L.* Tingha; Glen Innes; Chandler's Peak; 10 miles SE of Guyra; Saumarez; Armidale to Rockvale; Chiswick, 10 miles S of Armidale; Terrible Vale, Kentucky area. NSW; NEU; JB.

***C. eragrostis** *Lam.* (*C. vegetus* Willd.). Gara River, Armidale to Wollomombi; 8·6 miles E of Wollomombi on Kempsey road. NES 2659 etc.

C. filipes *Benth.* Wallangarra. (Kükenthal 1936.)

C. flaccidus *R.Br.* Glen Innes. NSW.

C. fulvus *R.Br.* (*Mariscus fulvus* (R.Br.) C. B. Clarke.). Jennings; 3 miles E of Inverell; Mingoola Dam site, app. 40 miles W of Tenterfield. NES 2645 etc; NSW.

C. fulvus *R.Br.*, var. **confusus** (*C. B. Clarke*) *Kükenth.* Tenterfield. (Kükenthal 1936.)

C. fulvus *R.Br.*, var. **viscidus** *Kükenth.* Tingha; Ashford area; Yarrowyck area; found in moist areas high on the slopes of granite hills. NES 2140 etc; NSW.

C. globosus *All.* (*Pycreus globosus* (All.) Reichenb.). Wellingrove area; Ben Lomond; not common. NES 2727; NSW.

C. gracilis *R.Br.* Widespread and fairly common. NES 2540 etc; NEU.

C. gunnii *Hook. f.* (*Mariscus gunnii* (Hook. f.) C. B. Clarke). Longford area; Parlour Mountains, Booroolong area; Dumaresq area; 2-mile Creek, Yarrowyck to Bundarra road. NES 2660 etc.

C. lucidus *R.Br.* (*Mariscus lucidus* (R.Br.) C. B. Clarke). Wylie Creek; Glen Elgin; Gwydir R., Yarrowyck area; Yarrowyck area; Rimbanda Road, Uralla to Bendmeer; generally growing in sand on the banks of rivers and streams. NES 3766 etc; NSW.

C. rotundus *L.* Riverton, Tenterfield area. Native to tropical parts of Australia, and probably introduced into the New England. CANB; JB.

C. rutilans (*C. B. Clarke*) *Maiden and Betche.* (*Mariscus rutilans* C. B. Clarke). Tingha area; Glen Innes; Moredun Creek; Bakers Ck; Armidale area; Chiswick, 10 miles S of Armidale; Uralla Lagoon; generally found in swampy areas near creeks and roadsides etc. NES 3889 etc; NSW; CANB; NEU; CSA.

C. sanguinolentus *Vahl.* (*C. eragrostis* Vahl., non Lam.; *Pycreus sanguinolentus* (Vahl.) Nees). Widespread and fairly common. NES 2653 etc.

***C. sesquiflorus** (*Torr.*) *Mattf. and Kükenth.* (*Kyllinga sesquiflora* Torr.). Bolivia. NES 2647.

C. unioloides *R.Br.* (*Pycreus unioloides* (R.Br.) Urb.). Glen Innes; Ben Lomond; Glen Elgin; Ebor. NSW; NEU; CANB.

C. vaginatus *R.Br.* 18 miles S of Tenterfield; vicinity White Rock Mountain, Glen Innes area. NES 3707 etc.

Eleocharis *R.Br.* (See Blake 1939.)

E. acuta *R.Br.* Widespread and common. NES 2214 etc.

E. atricha *R.Br.* Wallangarra. (Blake 1939.)

E. cylindrostachys *Boeck.* Wallangarra; Glen Innes to Deepwater, on edge of dam, solodic soil derived from porphyry; Deepwater. NES 3434; NSW.

E. gracilis *R.Br.* (*E. multicaulis* Benth.). Torrington area; Llangothlin; Rigney Creek; swampy areas. NES 3904 etc; NEU.

E. pallens *S. T. Blake.* (*E. acuta* R.Br., var. *pallens* Benth.). Inverell; Glen Innes; Armidale. (Blake 1939.)

E. plana *S. T. Blake.* Tia to Walcha. (Blake 1939.)

E. pusilla *R.Br.* Glen Innes; Guyra; Armidale; Uralla Lagoon. NEU.

E. sphacelata *R.Br.* Guyra Lagoon; Uralla Lagoon; 9 miles N of Carlyle's Gully, growing in dam; Thomas' Lagoon, SW of Armidale. NES 2292.

Fimbristylis *Vahl*

F. cinnamometorum (*Vahl*) *Kunth.* (*F. cyperoides* R.Br.). Glen Elgin. CANB.

F. dichotoma (*L.*) *Vahl.* sens. lat. Maryland to Wylie Creek road turnoff. Variable, widespread and fairly common. The Australian representatives of this group are in need of revision. NES 3769.

Gahnia *Forst.* (See Benl 1940; Kükenthal 1943.)

G. aspera (*R.Br.*) *Spreng.* Fairly common, on granite and porphyry hills throughout the area. NES 2178 etc.

G. erythrocarpa *R.Br.* Point Lookout area. NEU.

G. sieberiana *Kunth.* (*G. tetragonocarpa* Boeck.). Tenterfield to Boonoo Boonoo, granite hill country with *E. campanulata* assoc. NES 3751.

Gahnia sp. aff. **G. sieberiana** *Kunth.* Top of Pheasant Mountain, Backwater area. The taxonomic position of this sp. is at present uncertain. NES 3454.

Gymnoschoenus *Nees*

G. sphaerocephalus (*R.Br.*) *Hook. f.* (*Mesomelaena sphaerocephala* Benth.; *Schoenus sphaerocephalus* Poir.) Doughboy Range, Ebor area; Gibraltar Range; peaty swamps in hilly granite country. NES 2651 etc.

Lepidosperma *Labill.*

L. filiforme *Labill.* Point Lookout area. NSW; NEU.

L. laterale *R.Br.* Vicinity Little Mt. Spirabo; Torrington area; 7 miles W of Yarrowyck; Doughboy Range, Ebor area; fairly common, generally growing on granite hills. NES 2757 etc.

L. limicola *Wakefield.* (*L. limicolum* Wakefield). Doughboy Range, Armidale to Ebor, hilly granite country. NES 2658.

L. tortuosum *F. Muell.* Doughboy Range, Armidale to Ebor. NES 2649 etc.

Machaerina *Vahl* (See Kükenthal 1942; Koyama 1956.)

M. acuta (*Labill.*) *L. Johnson et T. Koyama.* (*Cladium acutum* (Labill.) Poir.; *C. schoenoides* R.Br.). Jennings to Boonoo Boonoo, swampy area in hilly granite country. NES 3743.

M. articulata (*R.Br.*). *T. Koyama.* (*Cladium articulatum* R.Br.). Amosfield to Maryland, dominant in small swamp NES 3765.

M. rubiginosa (*Spreng.*) *L. Johnson et T. Koyama.* (*Cladium glomeratum* R.Br.). Jennings to Boonoo Boonoo; 12 miles NE of Tenterfield on Woodenbong road; Glen Elgin to Dundee; Doughboy Range, Ebor area. Fairly common in swampy areas on hilly granite country along the eastern edge of the area. NES 3835 etc.

Ptilanthelium *Steud.*

P. deustum (*R.Br.*) *Kükenth.* (*Mesomelaena deusta* Benth.; *Schoenus deustus* F. Muell.; *Carpha deusta* R.Br.). Stannifer; 7 miles S of Tingha; Wollomombi area, 1 mile E of dog gate. NES 2650 etc; NEU.

Rhynchospora *Vahl*

R. brownii *R. and S.* (*R. laxa* R.Br. non Vahl.). Murson Creek, Boonoo Boonoo to Wilson's Downfall; Glen Elgin to Dundee; Wollomombi, 1 mile E of dog gate; swampy areas in hilly granite country. NES 3757; NEU.

Schoenus *L.*

S. apogon *R. and S.* (*S. brownii* Hook. f.). Widespread and fairly common NES 1725 etc.

S. melanostachys *R.Br.* Tenterfield to Boonoo Boonoo; vicinity Little Mt. Spirabo; Wallangarra. NES 2761; NSW.

Scirpus *L.*

S. calocarpus *S. T. Blake.* (*S. setaceus* Benth. non L.). Fairly widespread and fairly common. NES 2310 etc. (Blake 1940.)

S. crassiusculus (*Hook. f.*) *Benth.* Barwick River. NSW; NEU.

S. inundatus (*R.Br.*) *Poir.* and forms. Bolivia; Parlour Mtns., Booroolong area; St. Helena Creek, Point Lookout area; Chiswick, 10 miles S of Armidale. NES 3422; NSW; NEU.

S. maritimus *L.* Walcha district, NSW.

S. merrillii (*Palla.*) *Kükenth. ex Merr.* Murson Creek, Boonoo Boonoo to Wilson's Downfall; Bolivia; St. Helena Creek, Point Lookout area. NES 3753. (Blake 1947.)

S. mucronatus *L.* Ward's Mistake area; Blue Hole, 9 miles SE of Armidale; Gara River, Armidale to Wollomombi; grows in clumps on sandy creek banks. NES 2723; NEU.

S. polystachyus *F. Muell.* Wallangarra; Wilson's Downfall; 18 miles S of Tenterfield; Sandy Creek, Baldersleigh Road, 16 miles W of Guyra; Parlour Mts., Booroolong area; Walcha area; Tia River; grows on sandy creek banks and swampy areas. NES 3706; NSW; NEU.

S. validus *Vahl.* (*S. lacustris* Benth. non L.). Fairly common on rivers, streams, lagoons, dams and swamps throughout the area. NES 3709 etc; NEU.

Scleria *Berg.*

S. sphacelata *F. Muell.* Mingoola Dam site, approx. 40 miles W of Tenterfield. NES 2539.

GRAMINEAE

Agropyron *Gaertn.*

***A. repens** (*L.*) *Beauv.* Uralla garden; Armidale Rubbish Dump; naturalised but not common. NES 3163 etc.

A. scabrum (*R.Br.*) *Beauv.* Widespread and common, found growing on a variety of soils. NES 2274 etc.

A. scabrum (*R.Br.*) *Beauv.*, var. **plurinerve** *J. Vickery.* Holotype from Inverell; Stonehenge; not common. NES 1845. (Vickery 1950.)

Agrostis *L.* (See Vickery 1941.)

A. aemula *R.Br.* (*Calamagrostis aemula* (R.Br.) Steud.) Guy Fawkes; Armidale; Guyra area. NES 3026.

A. avenacea *Gmel.* (*Deyeuxia forsteri* (Rich. ex Roem. et Schult.). Kunth.) Widespread and common in the area. NES 1741 etc.

A. hiemalis (*Walt.*) *B.S.P.* (*Agrostis scabra* Willd., non R.Br.). Glen Elgin; Boonoo Boonoo; Inverell; Guyra area; Walcha area. CANB.

***A. tenuis** *Sibth.* Ebor Falls. Fairly rare. JB.

A. venusta *Trin.* Inverell. (Vickery 1941.)

Aira *L.*

*__A. cupaniana__ *Guss.* Widespread and very common. NES 2213 etc; NEU.

Alopecurus *L.* (See Andrew 1941.)

*__A. pratensis__ *L.* Armidale. BRI.

Amphibromus *Nees* (See Morris 1934.)

A. neesii *Steud.* Fairly widespread. Mainly grows in shallow waterlogged depressions and swampy areas on soils containing massive ortstein (ironstone). NES 2279 etc; JB.

Amphipogon *R.Br.* (See Vickery 1950.)

A. strictus *R.Br.* Wallangarra; Gibraltar Range, NE of Glen Innes; common on the Gibraltar Range on soil derived from a very acid granite. NES 3048.

Anthoxanthum *L.*

*__A. odoratum__ *L.* Ben Lomond; Walcha; Armidale Pine Forest; rare. JB; BRI.

Aristida *L.* (See Henrard 1929-1932.)

A. caputmedusae *Domin* Tilbuster Creek, N of Armidale. JB.

A. echinata *Henrard.* Tilbuster Creek, N of Armidale. JB.

A. jerichoensis *Domin ex Henrard* var. **subspinulifera** *Henrard.* 13 miles S of Emmaville, rough hilly country, growing on soil derived from porphyrytic rocks. NES 1941.

A. leptopoda *Benth.* Inverell area, growing on soils derived from basalt. NES 2806.

A. personata *Henrard.* Tilbuster Creek, north of Armidale. JB.

A. ramosa *R.Br.* A somewhat variable species; widespread in the area and very common, especially on soils derived from granite in the western half of the area. NES 2790 etc.

A. vagans *Cav.* Widespread and fairly common; similar distribution to the above species. NES 2781 etc.

A. warburgii *Mez.* Rigney Creek; Llangothlin; not common. NES 3779; NEU.

Aristida sp. aff. **A. calycina** *R.Br.* and **A. glumaris** *Henrard.* This species occurs in the Moredun Creek area, and on the Gibraltar Range, NE of Glen Innes. At present, its taxonomic position is uncertain. NES 3175 etc.

Arrhenatherum *Beauv.*

*__A. elatius__ (*L.*) *J. et C. Presl.* (*A. avenaceum* Beauv.). Armidale, in gardens and waste places; not common. NES 3024.

Arthraxon *Beauv.*

A. hispidus (*Thunb.*) *Makino.* Flaggy Creek, Glen Elgin; growing at water's edge, not common. CANB.

Arundinella *Raddi.*

A. nepalensis *Trin.* Common in hilly granite country, especially in the western half of the area. NES 1624 etc.

Avena *L.*

*A. **fatua** *L.* Very variable; widespread, and common on roadsides and waste places in towns. NES 3217.

*A. **sativa** *L.* Very variable; fairly widespread in the area, spontaneous in cultivated land and waste places.

Bothriochloa *O. Kuntze* (See Blake 1944.)

B. ambigua *S. T. Blake.* Very widespread and very common. NES 2642 etc.

B. biloba *S. T. Blake.* Inverell; 10 miles N of Armidale, on New England Highway; an uncommon roadside plant in both localities. NES 1684 etc.

B. decipiens (*Hack.*) *C. E. Hubbard.* Walcha area; Mingoola Dam site, Severn River approx. 40 miles W of Tenterfield. NES 2523 etc.

B. intermedia (*R.Br.*) *A. Camus.* (*Andropogon intermedius* R.Br.). Glen Innes.

Brachiaria *Griseb.*

***B. advena** *J. Vickery.* Guyra and Glen Innes areas. (Vickery 1950.)

Briza *L.*

***B. maxima** *L.* Armidale township; Kentucky; roadsides and waste places. NES 3034.

***B. minor** *L.* Widespread and very common.

Bromus *L.*

***B. brevis** *Steud.* (*Ceratochloa brevis* Nees. ex Steud.). May be only a form of *B. unioloides* H. B. K.; fairly widespread and fairly common. NES 1702 etc.

***B. diandrus** *Roth.* (*B. gussonii* Parl.; *B. maximus* auct. austr., non Desf., non Gileb.). Armidale; Chiswick, 10 miles S of Armidale. NES 1703.

***B. madritensis** *L.* Armidale. NEU.

***B. mollis** *L.* (*Serrafalcus mollis* (L.) Parl.). Fairly widespread, fairly common. NES 1733.

***B. sterilis** *L.* Deepwater. NSW.

***B. unioloides** *H. B. K.* (*Ceratochloa unioloides* (H. B. K.) Beauv.). Widespread, common in towns on waste places etc. NES 1729 etc.

Several other species of *Bromus* occur as rare species in the area, but these have not yet been determined.

Capillipedium *Stapf* (See Blake 1944.)

C. parviflorum (*R.Br.*) *Stapf.* (*Chrysopogon parviflorus* (R.Br.) Benth.). Fairly widespread, commonly found in the fenced areas along railway lines.

C. spicigerum *S. T. Blake.* Inverell; Moona Plains; not common. (Blake 1944.)

Catapodium *Link*

***C. rigidum** (*L.*) *C. E. Hubbard.* (*Scleropoa rigida* (L.) Griseb.; *Desmazeria rigida* (L.) Tutin E. B.). Fairly widespread but of sparse occurrence. NES 1735 NEU.

Cenchrus *L.*

C. australis *R.Br.* Tenterfield. NSW.

Chloris *Swartz*

C. divaricata *R.Br.* Inverell area. NES 2801.

***C. gayana** *Kunth.* 2 miles N of Tenterfield, on roadside. NES 3717.

C. truncata *R.Br.* Widespread and very common. NES 191 etc.

C. ventricosa *R.Br.* Bolivia; 3 miles N of Stannifer. NES 2782 etc.

Cymbopogon *Spreng.*

C. obtectus *S. T. Blake.* Chandler's Peak, Guyra area. (Blake 1944.)

C. refractus (*R.Br.*) *A. Camus.* (*Andropogon refractus* R.Br.) Widespread and fairly common. NES 185 etc.

Cynodon *L. C. Rich.*

***C. dactylon** (*L.*) *Pers.* Widespread and common. NES 2112; NEU.

Dactylis *L.*

***D. glomerata** *L.* A common constituent of improved pastures in the area, and occasionally found naturalised on roadsides and on waste places in the vicinity of towns. NES 1836.

Danthonia *DC.* (See Vickery 1956.)

D. carphoides *F. Muell. ex Benth.* Little Lagoon, 5 miles S of Guyra; Armidale; rare. (Vickery 1956.)

D. eriantha *Lindl.* Fairly widespread but of sparse distribution; generally found in valleys on soils derived from sedimentary rocks. NES 1855 etc.

D. induta *J. Vickery.* Holotype from Armidale. Fairly common in the Armidale and Guyra areas and mainly found on hills of sedimentary rocks with a good forest cover; Kilburnie, on the Woolbrook-Campfire road, 4,000 feet; Walcha Road; quickly eliminated by clearing and grazing. NES 3253 etc.

D. laevis *J. Vickery.* Widespread and common in the area. NES 2369 etc.

D. linkii *Kunth.* Widespread and common. The most common *Danthonia*, in valleys on black earth and wiesenboden soils derived from basalt. NES 3208 etc.

D. longifolia *R.Br.* Fairly widespread but of somewhat sparse occurrence. Mainly found in hilly areas of porphyritic and granitic rocks. NES 2095 etc.

D. monticola *J. Vickery.* Parlour Mts.; Moredun Creek; Limestone Creek; Walcha district. Mainly on solodic soils derived from porphyritic rocks. In the Moredun Creek area this species forms hollow rings up to 15 inches in diameter. NES 3125 etc.

D. pallida *R.Br.* Mainly found near the tops of high granite hills in the western half of the area, from Toryburn to Tenterfield. A small-flowered form with a large open panicle, (NES 3047), is found on the Gibraltar Range, NE of Glen Innes. NES 2495 etc.

D. pilosa *R.Br.* Common in the Ben Lomond area, otherwise fairly common on the high basalt country from Glen Innes to Walcha. NES 3857.

D. purpurascens *J. Vickery.* Widespread and fairly common, especially on hilly granite country in the eastern half of the area. NES 1943 etc.

D. racemosa *R.Br.* Widespread and common in the area; found on a variety of soils. NES 3025 etc.

D. racemosa *R.Br.*, var. **obtusata** *F. Muell. ex Benth.* Fairly widespread, but of very sparse occurrence. NES 3111 etc.

D. richardsonii *Cashmore.* Fairly widespread in the area and fairly common. Mainly on soils derived from sedimentary rocks. NES 1669 etc.

Deyeuxia *Clar. ex Beauv.* (See Vickery 1940.)

D. acuminata *J. Vickery.* Type from 17 miles NE of Guyra; granite hills near Oban.

D. brachyathera (*Stapf*) *J. Vickery.* (*Dichelachne brachyathera* Stapf). Point Lookout area; rare. NEU.

D. gunniana (*Nees*) *Benth.* (*Calamagrostis breviglumis* (Benth.) Maiden and Betche; *Deyeuxia breviglumis* Benth.). Tenterfield to Sandy Flat; Glen Elgin; Ebor; Walcha District; Wollomombi area; Entrance to New England National Park, Point Lookout area. NEU.

D. imbricata *J. Vickery.* Type from Glen Innes; Glen Elgin; Inverell; turnoff to Pt. Lookout, Armidale-Ebor road; Parlour Mts., Booroolong area; Walcha area. NES 3131 etc.

D. mckiei *J. Vickery.* Type from Black Gully, 7 miles NW of Guyra; Elderbury Creek, 7 miles SW of Guyra; Boonoo Boonoo; Walcha district.

D. parviseta *J. Vickery.* Pheasant Mt., Backwater area; 12 miles from Tenterfield on road to Woodenbong; vicinity of Little Mt. Spirabo; generally found growing in *Eucalyptus campanulata* association. NES 2751.

D. quadriseta (*Labill.*) *Benth.* A variable species, fairly widespread and fairly common. For various forms see Vickery 1940. NES 3140 etc.

Dichanthium *Willem.*

D. sericeum (*R.Br.*) *A. Camus.* Inverell area. NES 2974.

D. setosum *S. T. Blake.* Fairly widespread and fairly common. NES 1843. (Blake 1944.)

Dichelachne *Endl.*

D. crinita (*L.f.*) *Hook. f.* Ben Lomond to Maybole; Guyra area; Uralla area; mainly found along the fences between cultivated paddocks and roads, not very common. NES 1848 etc.

D. rara (*R.Br.*) *J. Vickery.* (*Agrostis rara* R.Br.). Fairly common in montane granite country in the eastern half of the area. NES 1893. (Vickery 1950.)

D. sciurea (*R.Br.*) *Hook. f.* A somewhat variable species, widespread and very common, in a variety of habitats. NES 2402 etc.

Digitaria *Heist. ex Fabric.* (See Hughes 1923; Henrard 1950.)

***D. adscendens** (*H. B. K.*) *Henrard.* (*D. marginata* Link). Clifton, W of Tenterfield.

D. brownii (*Roem. et Schult.*) *Hughes.* Fairly widespread and fairly common; mainly found in hilly quartzite country in the western half of the area. NES 2779 etc.

D. coenicola (*F. Muell.*) *Hughes.* (*Panicum coenicolum* F. Muell.). 3 miles E of Inverell, *Eucalyptus albens* association, on soil derived from basalt. NES 2638.

D. coenicola (*F. Muell.*) *Hughes* var. **ramosa** *J. Vickery.* Holotype from Oakwood, via Inverell. (Vickery 1950.)

D. diminuta *Hughes.* Toabinga, Moredun Creek near Guyra; Moredun Creek, 27 miles NW of Guyra; Booroolong; Howell. (Vickery 1950.)

D. ramularis (*Trin.*) *Henrard.* Pheasant Mt., Backwater; Tenterfield to Glen Innes; 6 miles N of Bundarra on Inverell road; vicinity of Little Mt. Spirabo; Torrington area. NES 2767 etc. (Vickery 1950.)

***D. sanguinalis** (*L.*). *Scop.* (*Panicum sanguinale* L.). Guyra; Armidale; common in gardens and waste places. NES 3162; BRI.

Digitaria sp. Vicinity of Yarrow Creek, NE of Glencoe; 8 miles E of Wollomombi on Kempsey Road. NES 2674, 2702.

Diplachne *Beauv.*

D. fusca (*L.*) *Beauv.* Inverell area. JB.

Echinochloa *Beauv.* (See Blake 1952.)

***E. crusgalli** (*L.*) *Beauv.* (*Panicum crusgalli* L.). A variable species. Armidale and other towns, in waste places. NES 1872 etc.

Echinopogon *Beauv.* (See Hubbard 1935; Cross 1943.)

E. caespitosus *C. E. Hubbard.* Widespread and common. The most common species of *Echinopogon* in the eastern half of the area. NES 2469 etc.

E. cheelii *C. E. Hubbard.* Type from Glen Innes; widespread and common, and found growing on a wide variety of soils. NES 3090 etc.

E. intermedius *C. E. Hubbard.* Type from Walcha Road; Glen Innes area; Howell area; Toryburn; Tenterfield to Glen Innes; fairly common. NES 2596 etc.

E. mckiei *C. E. Hubbard.* Type from Yellow Gap, Oban Road, NE of Guyra; Glen Elgin; Glencoe; Guyra district; Parlour Mts.; Moredun Creek; Chiswick, 10 miles S of Armidale; Walcha district. A widespread species of sparse occurrence. NES 3032 etc; CANB.

E. nutans *C. E. Hubbard,* var. **major** *C. E. Hubbard.* Type from Wandsworth, 15 miles NW of Guyra.

E. ovatus (*G. Forst.*) *Beauv.* Walcha. (Hubbard 1935.)

E. phleoides *C. E. Hubbard.* Type from Wandsworth, 15 miles NW of Guyra; Limestone Creek, 5 miles beyond Tenterden. (Hubbard 1935.)

Eleusine *Gaertn.*

***E. tristachya** (*Lam.*) *Lam.* Armidale; Guyra; Wallangarra. JB; BRI.

Enneapogon *Desv. ex Beauv.* (See Burbidge 1941.)

E. gracilis (*R.Br.*) *Beauv.* (*Pappophorum gracile* R.Br.). Mingoola Dam site, app. 40 miles W of Tenterfield. NES 2547 etc.

E. nigricans (*R.Br.*) *Beauv.* (*Pappophorum nigricans* R.Br.). Widespread and common. NES 2322 etc.

Entolasia *Stapf*

E. marginata (*R.Br.*) *Hughes.* (*Panicum marginatum* R.Br.). Maryland to Wylie Creek; Walcha, on railway embankment; not common. NES 3771; BRI. (Hughes 1923.)

E. stricta (*R.Br.*) *Hughes.* (*Panicum strictum* R.Br.; *P. marginatum* R.Br., var. *strictum* Benth.). Widespread in the area and occurring on skeletal granite hills. NES 2497 etc. (Hughes 1923.)

Eragrostis *Beauv.*

E. brownii (*Kunth*) *Nees.* A variable species, very widespread and very common. NES 2722 etc.

***E. chloromelas** *Steud.* Tenterfield and Glen Innes areas, mainly on roadsides; not common. According to L. K. A. Chippindall in "The Grasses and Pastures of South Africa" (1955), this species and *E. curvula* grade completely into each other. NES 3720; NSW.

***E. cilianensis** (*All.*) *Lutati.* Guyra; Armidale etc. Mainly in the vicinity of towns, on roadsides and waste places. NES 3716; BRI.

***E. curvula** (*Schrad.*) *Nees.* Shannon Vale; Bolivia to Glen Innes; Wellingrove area. Mainly on roadsides in areas with solodic soils. The Shannon Vale specimen however, was growing on soil derived from basalt. See *E. chloromelas.* NES 2667 etc.

E. elongata *Jacq.* Howell Well. NES 2825.

E. leptostachya *Steud.* Widespread and fairly common. NES 2635 etc.

E. molybdea *J. Vickery.* Widespread and very common. NES 2628 etc.

E. parviflora (*R.Br.*) *Trin.* Fairly widespread in the area, but of somewhat sparse occurrence. NES 2627 etc.

E. philippica *Jedw.* Jennings; Glen Innes area; Gibraltar Range, NE of Glen Innes. Difficult to distinguish from some forms of *E. brownii.* NES 3239; NSW.

E. trachycarpa (*Benth.*) *Domin.* (*E. nigra* var. *trachycarpa* Benth.). Fairly widespread in the area, fairly common on the soils derived from basaltic rocks but of sparse occurrence elsewhere. NES 2716 etc.

Eremochloa *Buse*

E. bimaculata *Hack.* Moredun Creek; Gilgai; Parlour Mts., Booroolong area. Not common, generally found on solodic soils. NES 3126 etc.

Eriochloa *H. B. K.*

E. procera (*Retz.*) *C. E. Hubbard.* Rob Roy, Inverell area. NSW.

Eulalia *Kunth*

E. fulva (*R.Br.*) *Kuntze.* (*Erianthus fulvus* (R.Br.) Kunth; *Pollinia fulva* (R.Br.) Benth., non Spreng.). Fairly widespread, fairly common. NES 184 etc.

Festuca *L.* (See Vickery 1939.)

***F. arundinacea** *Schreb.* Growing by the roadsides near Saumarez Creek, 5 miles S of Armidale; Guyra township. NES 3157 etc.

F. asperula *J. Vickery.* (*F. duriuscula* auct. austr., non L.). Type from Puddledock, 14 miles NE of Armidale; Ben Lomond; Moona Plains, Walcha. (Vickery 1939.)

F. eriopoda *J. Vickery.* 12 miles NE of Guyra on Oban Road, on soil derived from granite. (Vickery 1939.)

Glyceria *R.Br.*

G. australis *C. E. Hubbard.* Guyra area, in similar habitats to *Amphibromvs neesii*, and often found growing with this species. NES 3142.

G. latispicea (*F. Muell.*) *Benth.* Inverell; Ben Lomond; Guyra area; 3 miles S of Guyra; Moona Plains. This species can tolerate drier conditions than *G. australis;* in the Guyra area it is found growing on roadsides and the area adjoining the railway line. NES 3484; NSW.

***G. maxima** (*Hartm.*) *Holmb.* (*G. aquatica* (L.) Wahlberg, non Presl.). Gibraltar Range, 40 miles NE of Glen Innes, growing in a large clump on the side of a small shallow stream. NES 3128.

Hemarthria *R.Br.*

H. uncinata *R.Br.* Fairly widespread but of somewhat sparse occurrence. In the Armidale and Guyra areas it is most often encountered in damp or marshy areas on roadsides or near creeks. NES 3153 etc.

Holcus *L.*

*__H. lanatus__ *L.* Fairly widespread. A species used in pasture improvement and naturalised on roadsides and waste places. NES 1892 etc.

Hordeum *L.*

*__H. leporinum__ *Link.* Widespread and very common. NES 2132.

Hyparrhenia *Anderss.*

*__H. hirta__ (*L.*) *Stapf.* Found growing on roadsides in the north-western portion of the area, of somewhat sparse occurrence. NES 1927.

Imperata *Cyr.*

I. cylindrica (*L.*) *Beauv.*, var. **major** (*Nees*) *C. E. Hubbard.* Widespread and common, especially in overgrazed granite areas. Often covers considerable areas, almost to the exclusion of other herbaceous species.

Isachne *R.Br.*

I. globosa (*Thunb.*) *Kuntze.* (*I. australis* R. Br.). Glen Elgin to Dundee; banks of Flaggy Creek, Glen Elgin; Murson Creek, Boonoo Boonoo to Wilson's Downfall. Grows on the banks of streams and in swampy areas in hilly granite country in these localities. Gara River, E of Armidale. NES 3759 etc.; CANB; CSA.

Koeleria *Pers.*

*__K. phleoides__ (*Vill.*) *Pers.* Fairly widespread and common, and found growing on a variety of soils. NES 2176 etc.

Lamarckia *Moench*

*__L. aurea__ (*L.*) *Moench.* 3 miles W of Uralla in granite gully; rare. NES 2058.

Lolium *L.*

*__L. multiflorum__ *Lam.* Naturalised in the vicinity of towns, and a constituent of improved pastures in the area. NES 1873.

*__L. perenne__ *L.* Widespread and common. Used extensively in improved pastures, and naturalised in a large variety of habitats. NES 2286 etc.

*__L. rigidum__ *Gaudin.* Inverell area; found growing spontaneously in damp habitats, not common. NES 3038.

*__L. temulentum__ *L.* Glen Innes district. NSW.

Microlaena *R.Br.*

M. stipoides (*Labill.*) *R.Br.* Somewhat variable in growth habit and vegetative characters. Widespread and common in the area, and most abundant in the shade of trees in hilly granite country. NES 2630 etc.

Oryzopsis *Michx.*

*__O. miliacea__ (*L.*) *Benth. et Hook. f.* Armidale township. Rare, and probably not naturalised in the real sense. NES 3121.

Panicum *L.* (See Hughes 1923.)

P. acroanthum *Steud.* (*P. melananthum* F. Muell.) Near Tenterfield. (Hughes 1923.)

P. effusum *R.Br.* (*P. effusum* var. *convallium* Benth.). A variable species, widespread and common in the area. NES 2633 etc.

P. fulgidum *Hughes.* (*P. bicolor* R. Br., non Moench.) Clifton, west of Tenterfield. (Hughes 1923.)

***P. laevifolium** *Hack.* 6 miles N of Llangothlin, in cultivated paddock; Moredun Creek. Generally found as a semi-prostrate roadside weed, however the plants growing in the cultivated paddock reached a height of 3 ft. 6 in. NES 2603 etc.

P. obseptum *Trin.* Thomas' Lagoon, SW of Armidale; Uralla area. A prostrate grass growing on the edges of dams and lagoons, the runners often floating in 6 in. to 1 ft. of water. NES 3479 etc.

P. queenslandicum *Domin.* Inverell area, on black earth derived from basalt. NES 2636.

P. queenslandicum *Domin.*, var. **acuminatum** *J. Vickery.* Holotype from Glen Innes; New England Highway, 15 miles S of Glen Innes, on black earth derived from basalt; 6 miles S of Guyra, on black soil flats; Brockley, 16 miles E of Guyra; Bellevue, 16 miles W of Glen Innes; Stonehenge; Inverell; Ben Lomond. NES 3133. (Vickery 1950.)

Paspalidium *Stapf*

P. aversum *J. Vickery.* Black Mountain, S of Guyra; Inverell. (Vickery 1950.)

P. gracile (*R.Br.*) *Hughes.* (*Panicum gracile* R.Br.) Mingoola Dam site, app. 40 miles W of Tenterfield, on skeletal quartzite hill in *Eucalyptus melanophloia* association. NES 2528.

Paspalum *L.*

***P. dilatatum** *Poir.* Widespread, and common in towns and in damp situations on the banks of streams throughout the area. NES 3071 etc.

P. distichum *L.* Common in the vicinity of towns, in gardens, lawns and waste places. NES 3070.

Pennisetum *L. C. Rich.*

P. compressum *R.Br.* Widespread and common, generally in damp sites NES 129 etc.

***P. villosum** *R.Br.* Fairly common in the vicinity of towns; on footpaths etc. in Armidale. NES 2634.

Pentapogon *R. Br.*

P. quadrifidus (*Labill.*) *Baill.* (*P. billardieri* R.Br.) Ben Lomond; Chiswick, 10 miles S of Armidale; rare. JB; BRI.

Phalaris *L.*

***P. canariensis** *L.* University grounds, Armidale, not common. NEU.

***P. minor** *Retz.* Naturalised in the area, mainly in the vicinity of towns and improved pastures. NEU.

***P. tuberosa** *L.* Naturalised and fairly widespread throughout the area on roadsides etc.; one of the major improved pasture species in the area. NES 3072.

Phleum *L.*

***P. pratense** *L.* Grows in damp places on roadsides in the Guyra and Llangothlin areas; not common. NES 3073 etc.

Phragmites *Trin.*

P. communis *Trin.* Fairly common in creeks and swampy places throughout the area. NES 2724 etc.

Poa *L.*

***P. annua** *L.* Very common in towns, and in the vicinity of habitations throughout the area.

***P. compressa** *L.* Armidale. NEU.

***P. pratensis** *L.* Armidale, on roadside. NSW.

Poa spp. The native species of *Poa* which have been referred to *P. caespitosa* Forst. f., and *P. australis* R.Br., are at present undergoing revision. These species together constitute a significant proportion of the natural pastures of the area.

Polypogon *Desf.*

***P. monspeliensis** (*L.*) *Desf.* Jennings; Tenterfield; Chiswick, 10 miles S of Armidale. Fairly widespread but of somewhat sparse occurrence, generally in damp situations on creek banks etc., in granite country. NES 3730 etc., JB.

Pseudoraphis *Griffith*

P. spinescens (*R.Br.*) *J. Vickery.* (*Chamaeraphis spinescens* (R.Br.) Poir.). Howell Well, a prostrate grass growing in mud on the edge of the well, and sending floating runners into the water; not common. NES 2824. (Vickery 1952.)

Secale *L.*

***S. cereale** *L.* Sometimes sub-spontaneous in the vicinity of cultivation. NES 3141.

Setaria *Beauv.*

S. australiensis (*Scribn. and Merrill*) *J. Vickery.* (*Chaetochloa australiensis* Scribn. and Merrill). Moona Plains. (Vickery 1950.)

***S. geniculata** (*Lam.*) *Beauv.*, var. **pauciseta** *Desv.* Kookabookra area; rare. NES 2720.

***S. glauca** (*L.*) *Beauv.* Fairly common in towns, cultivation, roadsides and waste places throughout the area. NES 2640 etc.

***S. viridis** (*L.*) *Beauv.* In similar habitats to *S. glauca* but much less common. NES 3705; NEU.

Sorghum *Moench* (See Hubbard 1938.)

S. leiocladum (*Hack.*) *C. E. Hubbard.* Widespread and common. NES 2380 etc.

Sporobolus *R.Br.*

S. elongatus *R.Br.* Widespread and very common. NES 146 etc.

Stipa *L.* (See Hughes 1921.)

S. aristiglumis *F. Muell.* Stannifer; Elsmore; Inverell area. NES 2794.

S. mollis *R.Br.* (*S. semibarbata* var. *mollis* Benth.). Parlour Mts., Booroolong area; 5 miles N of Armidale on New England Highway; Wollomombi to Ebor; not common. NES 2856 etc; NEU.

S. nervosa *J. Vickery.* Widespread and fairly common. NES 2622 etc. (Vickery 1950.)

S. nervosa *J. Vickery*, var. **neutralis** *J. Vickery.* Yooroonah, Wollomombi to Ebor; Walcha. (Vickery 1950.)

S. pubescens *R.Br.* Wellingrove; Tingha area; Gibraltar Range, 40 miles NE of Glen Innes. Generally found in hilly granite country. NES 2381 etc.

S. scabra *Lindl.* Widespread and common. NES 2337 etc.

S. setacea *R.Br.* W. Skinner's paddock, Green Valley, Guyra area. NSW. (Hughes 1921.)

S. verticillata *Nees.* Fairly common on roadsides and stock reserves in the north-west portion of the area, e.g. Strathbogie and Inverell areas. NES 1933 etc.

The closely related *S. ramosissima* Trin., occurs on the margins of Rain Forests in the north-eastern portion of the area.

Themeda *Forsk.*

T. australis (*R.Br.*) *Stapf.* (*Anthistiria ciliata* Benth., non L.) A variable species, widespread and very common in the area. NES 3243 etc.

T. avenacea (*F. Muell.*) *Durand et Jackson.* Brodies Plains, E of Inverell. Generally along roadsides in the Inverell area, not common. NES 2799.

Tragus *Hall.*

T. australianus *S. T. Blake.* Glen Innes, rare on roadsides; Guyra, Mingoola Dam site, app. 40 miles W of Tenterfield; fairly rare. NES 2531. (Blake 1941.)

Tripogon *Roth*

T. loliiformis (*F. Muell.*) *C. E. Hubbard.* (*Diplachne loliiformis* (F. Muell.) F. Muell. ex Benth.). Fairly widespread and fairly common. NES 198 etc.

Vulpia *Gmel.*

***V. bromoides** (*L.*) *S. F. Gray.* (*Festuca bromoides* L.). Very widespread and very common in the area. NES 2234.

***V. megalura** (*Nutt.*) *Rydb.* (*Festuca megalura* Nutt.). 8 miles W of Uralla on road to Yarrowyck, growing on soil derived from granite. NES 3035.

***V. myuros** (*L.*) *Gmel.* (*Festuca myuros* L.). Chiswick, 10 miles S of Armidale; Dumaresq area. NES 1798 etc.

DICOTYLEDONEAE

CASUARINACEAE

Casuarina *L.*

C. cunninghamiana *Miq.* Fairly common along the larger streams and rivers in the western half of the area, also found on some streams in the eastern half, e.g. Bluff River, near Sandy Flat; Blue Hole, 9 miles SE of Armidale; Oaky River, S of Yooroonah; MacDonald River, Bendemeer; etc.

C. inophloia *F. Muell. and F. M. Bail.* Ashford to Strathbogie. NES 92.

C. littoralis *Salisb.* (*C. suberosa* Ott. and Dietr.). Common in the eastern half of the area, and also found in the Torrington area. NES 1524 etc., NEU.

C. luehmannii *R. T. Baker.* S of Emmaville, country adjoining the Severn River; Rangers Valley area.

C. rigida *Miq.* Gibraltar Range, 40 miles NE of Glen Innes; Pheasant Mountain, Backwater area; Point Lookout; montane granite country in the eastern half of the area. NES 3053 etc.; NEU.

C. torulosa *Ait.* Fairly common on the easternmost edge of the area, but mainly on the slopes from the tablelands to the coast. Remnant observed near the Rock of Gibraltar, S of Clifton. NES 2000 etc.

MORACEAE

Ficus *L.*

F. rubiginosa *Desf. ex Vent.*, form. Deepwater; Howell; Yarrowyck area; rocky hills. NES 2180; NSW.

URTICACEAE

Urtica *L.*

U. incisa *Poir.* Widespread and common. NES 1779 etc.

* **U. urens** *L.* Chiswick, 10 miles S of Armidale; Armidale. BRI.

PROTEACEAE

Banksia *L. f.*

B. collina *R.Br.* Vicinity of Little Mt. Spirabo; Glen Elgin; Torrington; Turner records this species from Lode Hill, Torrington area. NES 2740; CANB.

B. integrifolia *L.* Fairly common in the eastern half of the area, and mainly on the granite ranges along the eastern edge of the region. NES 2615.

B. marginata *Cav.* Gibraltar Range. NSW.

B. spinulosa *Sm.* form. Doughboy Ranges. NES 2083.

Conospermum *Sm.*

C. longifolium *Sm.* form. Gibraltar Range. NES 3088.

C. taxifolium *Sm.* Torrington area. NES 53.

Grevillea *R. Br. ex Knight corr. R.Br.*

G. acanthifolia *A. Cunn.* var. **stenomera** *F. Muell. ex Benth.* Bullock Creek, Point Lookout area. NSW.

G. floribunda *R.Br.* Tingha area; Howell; not common. NES 2371. (Maiden 1906.)

G. juniperina *R.Br.* (*G. trinervis* R.Br.). Torrington area; Mt. Slow, Glen Innes area; Glen Elgin to Dundee; observed Oban area. NES 1971. (Cambage 1908.)

G. linearifolia (*Cav.*) *Druce* form. (*G. linearis* R.Br.). Silent Grove, Torrington area; Bismuth; Tungsten. NES 56, 70; NSW.

G. ramosissima *Meisn.* Ashford to Strathbogie; Stannifer; Parlour Mts., Booroolong area. NES 2075 etc.

G. sarmentosa *Blakely and McKie.* Type from Pheasant Mountain, Backwater area; granite ranges near Backwater. NES 3455. (Blakely and McKie 1930.)

G. sphacelata *R.Br.* form. Gibraltar Range. NES 3061.

Hakea *Schrad.*

H. dactyloides *Cav.* Emmaville; Longford area; Gibraltar Range; Torrington; Parlour Mountains, Booroolong area. NES 2445 etc.; NSW.

H. eriantha *R.Br.* Very variable in leaf shape. Vicinity Little Mt. Spirabo; Doughboy Range; Parlour Mts; Wollomombi Falls; Apsley Falls; Blue Hole, 9 miles E of Armidale. NES 2748 etc.; NEU.

H. fraseri *R.Br.* Tia Falls. NSW.

H. microcarpa *R.Br.* Variable in leaf shape; Torrington; Howell; Tingha; Parlour Mts.; Ebor Falls; Point Lookout; Oorundunby. NES 2167 etc; NEU. (Maiden 1906.)

H. propinqua *A. Cunn.* Torrington. NSW.

Isopogon *R.Br.*

I. petiolaris *A. Cunn. ex R.Br.* Silent Grove, Torrington area; Emmaville; Howell; Tingha; Longford to Baldersleigh; Moredun Dam; Ponds Creek. NES 2509; NSW. (Maiden 1906.)

I. anemonifolius (*Salisb.*) *Knight.* Torrington. NSW.

Lomatia *R. Br.*

The species of *Lomatia* in the area were not dealt with during the survey.

Persoonia *Sm.*

This genus is at present under revision by Mr. L. A. S. Johnson, National Herbarium of N.S.W.

P. attenuata *R.Br.* Guy Fawkes to Wollomombi. NSW.

P. chamaepeuce *Lhotsky ex Meissn.* Stonehenge; Apsley Falls; Walcha district. NSW. (Maiden and Betche 1899.)

P. cornifolia *A. Cunn.* and forms. Very variable, widespread in hilly granite country. NES 2457 etc.

P. fastigiata *R.Br.* Parlour Mountains, Booroolong area. NES 1465; NEU.

P. linearis *Andr.* Tia Falls. NES 2004.

P. nutans *R.Br.* sens. lat. (*P. oxycoccoides* Sieb. ex Schult. et f.) Torrington; Point Lookout area. NES 67 etc.; NEU.

P. prostrata *R.Br.* Yarrow Creek; Point Lookout; Styx River. NES 2623; NEU.

P. sericea *A. Cunn.* Wellingrove area; Torrington. NES 2878 etc. (Cambage 1908.)

P. tenuifolia *R. Br.* Tenterfield to Boonoo Boonoo; Torrington. NES 3184 etc. (Cambage 1908.)

Persoonia sp. nov. (*P. mitchellii* auct.). Howell; Tingha. (Cambage 1904. Maiden 1906.)

Petrophile *Salisb.*

P. canescens *A. Cunn. ex R.Br.* and forms. Fairly widespread and fairly common on hilly granite country throughout the area. NES 2383 etc; NSW.

Telopea *R. Br.*

T. speciosissima (*Sm.*) *R.Br.* Gibraltar Range. NES 3054.

SANTALACEAE

Choretrum *R. Br.*

C. candollei *F. Muell. ex Benth.* 1 mile N of Howell, on Copeton road; Howell; Inverell. NES 1658; NSW.

C. pauciflorum *DC.* Tia Falls; Apsley Falls; Doughboy Range. NES 2891; NSW.

Exocarpos *Labill.*

E. cupressiformis *Labill.* Fairly widespread and fairly common. NES 74 etc.

E. strictus *R.Br.* Torrington; Parlour Mountains. NES 1816. (Cambage 1908.)

Santalum *L.*

S. obtusifolium *R.Br.* Top of Dangar's Falls. NES 1656.

Thesium *L.*

T. australe *R.Br.* 4 miles E of Glen Innes; Wongwibinda; Chiswick, 10 miles S of Armidale; widespread but of sparse occurrence. NES 2424 etc.

OLACACEAE

Olax *L.*

O. stricta *R. Br.* Mingoola Dam site, 40 miles W of Tenterfield; Torrington; Howell. NES 2549. (Maiden 1906, Cambage 1908.)

LORANTHACEAE

Amyema *Tiegh.* (See Blakely 1922-1928, Danser 1929.)

A. cambagei (*Blakely*) *Danser.* (*Loranthus cambagei* Blakely). Wallangarra; Gwydir River, Yarrowyck area; parasitic on *Casuarina cunninghamiana.* NES 2185. (Blakely 1923.)

A. congener (*Sieb. ex Schult.*) *Tiegh.* form. (*Loranthus congener* Sieb. ex Schult. form). 17 miles E of Tenterfield, parasitic on *Casuarina torulosa.* NES 18.

A. linophylla (*Fenzl*) *Tiegh.* (*Loranthus linophyllus* Fenzl.). North-west portion of area, parasitic on *Casuarina luehmannii.* NES 52.

A. miquelii (*Lehm. ex Miq.*) *Tiegh.* (*Loranthus miquelii* Lehm. ex. Miq.). Fairly widespread and fairly common. NEU. (Blakely 1922.)

A. pendula (*Sieb. ex Spreng.*) *Tiegh.* (*Loranthus pendulus* Sieb. ex Spreng.). Widespread and fairly common. NES 2949; NEU; NSW. (Blakely 1922.)

A. quandang (*Lindl.*) *Tiegh.* (*Loranthus quandang* Lindl.) Edge Wollomombi gorge, on *Acacia* sp. NSW.

Dendrophthoe *Mart.* (See Blakely 1922-1928, Danser 1929.)

D. vitellina (*F. Muell.*) *Tiegh.* form. (*Loranthus vitellinus* F. Muell, var. *glabrescens* Blakely). Wallangarra; 25 miles N of Torrington; Inverell. NES 41. (Blakely 1925.)

Notothixos *Oliv.*

N. cornifolius *Oliv.* Yarrowyck area. NES 2182.

Phrygilanthus *Eichl.*

P. bidwillii (*Benth.*) *Eichl.* (*Furcilla bidwillii* (Benth.) Tiegh.). Wallangarra (Blakely 1922.)

P. celastroides (*Sieb. ex Schult.*) *Eichl.* (*Muellerina celastroides* (Sieb. ex Schult.) Tiegh.). Round Mountain, Guy Fawkes area. (Blakely 1922.)

P. eucalyptoides (*DC.*) *Danser.* (*P. eucalyptifolius* (Sieb. ex Schult.) Engler.) Wallangarra; Maryland area; Moredun Creek; Guyra; Uralla. NES 3774; NSW. (Blakely 1922.)

POLYGONACEAE

Muehlenbeckia *Meissn.*

M. adpressa *Meissn.* Tenterfield. (Maiden and Betche 1906.)

M. rhyticarya *F. Muell.* Howell. NES 1681. (Maiden and Betche 1906.)

Polygonum *L.* (See Danser 1927.)

***P. aviculare** *L.* Jennings area, on roadside; Armidale, gardens, waste places etc. NES 3732; NSW.

***P. convolvulus** *L.* Stonehenge; Guyra area; Armidale, University Farm. NES 3148; NSW; NEU.

P. hydropiper *L.* Parlour Mountains, Booroolong area. NES 3475.

P. lapathifolium *L.* Fairly widespread. NES 2584; NSW.

P. minus *Huds.* Glen Elgin. CANB.

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P. praetermissum *Hook. f.* Glen Elgin; rare. NES 3827.

P. prostratum *R.Br.* Armidale, near Pine Forest; Chiswick, 10 miles S of Armidale. CSA; NEU.

Rumex *L.*

***R. angiocarpus** *Murb.* (*R. acetosella* auct.) Widespread and very common. NES 1780 etc.

R. brownii *Campd.* Widespread and common. NES 2126 etc.

***R. conglomeratus** *Murr.* Armidale area, on roadsides and waste places. NES 2812.

***R. crispus** *L.* Fairly widespread and fairly common, on roadsides and waste places in damp situations. NES 2298 etc.

CHENOPODIACEAE

Atriplex *L.*

A. semibaccata *R.Br.* Fairly common in waste places and on the sides of footpaths in Armidale township. NES 3859.

Chenopodium *L.*

***C. album** *L.* Armidale and Guyra areas; common in waste places and old cultivation. NES 3182 etc.

***C. ambrosioides** *L.* Hillgrove. NSW.

C. carinatum *R.Br.* (*C. pumilio* R. Br.). Fairly widespread and fairly common. NES 2793 etc.; NEU; JB.

C. trigonon *Roem. and Schultes*, form. Abington area, not common. NES 2957.

Kochia *Roth*

K. tamariscina (*Lindl.*) *J. M. Black.* (*K. microphylla* (Moq.) F. Muell.). Bukkulla to Pindari, on roadsides. NES 2038.

Rhagodia *R. Br.*

R. hastata *R.Br.* Tenterfield to Sandy Flat. NSW.

R. nutans *R.Br.* Fairly widespread, but of somewhat sparse occurrence. NES 2388.

AMARANTHACEAE

Alternanthera *Forsk.*

A. denticulata *R.Br.* Fairly widespread, but of somewhat sparse occurrence. NES 2804 etc.

A. nana *R.Br.* Gostwyck. CANB; JB.

Amaranthus *L.*

***A. hybridus** *L.* sens. lat. Armidale and Guyra areas; common in waste places and old cultivation. NES 3174.

A. macrocarpus *Benth.* 3 miles N of Stannifer, on Elsmore road; *Eucalyptus albens* association on basalt hill. NES 2792.

***A. viridis** *L.* Armidale township. NES 3246.

NYCTAGINACEAE

Boerhavia *L.*

B. diffusa *L.* Inverell area. NES 2386.

PHYTOLACCACEAE

Phytolacca *L.*

***P. octandra** *L.* Jennings to Tenterfield; Maryland, a roadside weed. NES 3746; CANB.

PORTULACACEAE

Calandrinia *H.B. et K.*

C. eremaea *Ewart.* Yarrowyck; Doughboy Ranges; hilly granite country; not common. NES 2210 etc.

Portulaca *L.*

P. bicolor *F. Muell.* var. **rosea** *Maiden and Betche.* Type from Howell; a rare plant, growing in moss on granite hills in the Howell area. NES 1664. (Maiden 1906.)

P. oleracea *L.* Fairly widespread, roadsides and waste places. NES 2789.

CARYOPHYLLACEAE

Arenaria *L.*

***A. serpyllifolia** *L.* Chiswick, 10 miles S of Armidale. CSA.

Cerastium *L.*

***C. balearicum** *F. Hermann.* Chiswick, 10 miles S of Armidale; rare. JB.

***C. viscosum** *L.* (*C. glomeratum* Thuill.). Widespread and fairly common. NES 2327 etc.

***C. vulgatum** *L.* Balala area; Wongwibinda area. NES 2416 etc.

Dianthus *L.*

***D. armeria** *L.* Armidale township; Chiswick, 10 miles S of Armidale. NES 1637.

Gypsophila *L.*

G. australis (*Schlecht.*) *A. Gray.* (*G. tubulosa* auct. austral.). Fairly widespread but of somewhat sparse occurrence. NES 2973; NEU; CSA.

Herniaria *L.*

***H. hirsuta** *L.* Armidale, roadsides and waste places. NSW.

Kohlrauschia *Kunth*

***K. prolifera** (*L.*) *Kunth.* (*Dianthus prolifer* L.; *Tunica prolifera* (L.) Scop.). Widespread and fairly common. NES 1771.

***K. velutina** (*Guss.*) *Reichb.* Armidale. NSW.

Moenchia *Ehrh.*

***M. erecta** (*L.*) *Gaertn., Mey. et Scherb.* (*Sagina erecta* L.; *Cerastium quaternellum* Fenzl.). Tenterfield. NSW.

Paronychia *Adans.*

***P. brasiliana** *DC.* (*P. chilensis* auct. austr. non DC.). Widespread and common. NES 1772 etc.

Polycarpon *L.*

P. tetraphyllum *L.* 9 miles N of Wellingrove, solodic soil; Armidale township, rubbish dumps and waste places; Chiswick, 10 miles S of Armidale; doubtfully native. NES 3899.

Saponaria *L.*

***S. officinalis** *L.* Armidale. NEU.

Scleranthus *L.*

***S. annus** *L.* Guyra; not common. NSW.

S. biflorus (*Forst.*) *Hook. f.* Fairly widespread and fairly common. NES 1965 etc.; NEU.

Silene *L.*

***S. anglica** *L.* (Includes *S. gallica* L.). Uralla area, on roadside in granite country. NES 2290.

Spergularia (*Pers.*) *J. et C. Presl*

***S. rubra** (*L.*) *J. et C. Presl.* 3 miles E of Glen Innes; Armidale area; Chiswick, 10 miles S of Armidale; fairly widespread but of sparse occurrence. NES 2314 etc.; NEU.

Stellaria *L.*

S. flaccida *Hook.* Point Lookout; this species may be associated with the *Nothofagus moorei* rain forest. NEU.

***S. media** (*L.*) *Vill.* Armidale; gardens and waste places. NEU.

S. palustris *Retz.* (*S. glauca* With.). Balala area; Yarrowyck area; damp situations in granite valleys in the western half of the area. NES 2328 etc.

S. pungens *Brongn.* Fairly widespread, and generally found on rocky outcrops near the tops of granite hills e.g. Mt. Duval, NW of Armidale etc. NES 2400 etc.

Stellaria sp. (*S. glauca* var. *leptoclada* Benth.). Parkwood, Inverell area; Tingha; Glen Innes; Ben Lomond; Wollomombi; Moona Plains; widespread but of sparse occurrence. NSW; NEU.

RANUNCULACEAE

Adonis *L.*

***A. annua** *L.* (*A. autumnalis* L.). Inverell area; rare. NES 3109.

Clematis *L.*

C. aristata *R. Br. ex DC.* Balala area; Wollomombi. NES 2405 etc.; NEU.

C. fawcettii *F. Muell.* Apsley Falls. NSW; NES 84.

C. glycinoides *DC.* Emmaville area. NES 84.

C. microphylla *DC.* Inverell. NSW.

C. microphylla *DC.*, var. **leptophylla** *F. Muell. ex Benth.* Tia Falls; Moona Plains. NSW.

Ranunculus *L.*

(See Melville 1956; Eichler 1958; Briggs 1959.)

R. inundatus *R.Br. ex DC.* Fairly widespread and fairly common, in swampy areas. NES 3160 etc.

R. lappaceus *Sm.* Fairly widespread and fairly common. NES 1754 etc.

R. pimpinellifolius *Hook.* Guy Fawkes; Guy Fawkes Creek gorge; Barwick R., Armidale-Point Lookout road. (Briggs 1959.)

***R. repens** *L.* Ebor area. NEU.

R. sessiliflorus *R. Br. ex DC.* var. **sessiliflorus.** Ashford area; Chiswick, 10 miles S of Armidale. NES 3016. (Melville 1956.)

R. trichophyllus *Chaix.* Tia River, Walcha area. NSW.

TRIMENIACEAE

Piptocalyx *Oliv.*

P. moorei *Oliv.* Dividing Range, between Sandy Flat and Mt. Spirabo; Guy Fawkes; Wollomombi; Hillgrove; fairly rare. NSW. (Maiden and Betche 1899.)

LAURACEAE

Cassytha *L.*

C. pubescens *R. Br.* Baldersleigh. NES 2494.

PAPAVERACEAE

Argemone *L.*

***A. mexicana** *L.* Fairly common on sandy areas near creeks, mainly in the western half of the area.

Papaver *L.*

P. aculeatum *Thunb.* (*P. horridum* DC.). Glen Innes; Guyra. NSW.

***P. dubium** *L.* Llangothlin. NES 3865.

***P. rhoeas** *L.* Chiswick, 10 miles S of Armidale. CSA.

***P. somniferum** *L.* Armidale, town rubbish dump. NES 3874.

FUMARIACEAE

Fumaria *L.*

***F. muralis** *Sond.* Inverell. NSW.

CRUCIFERAE

Brassica *L.*

***B. campestris** *L.* Glen Innes district. NSW.

***B. juncea** (*L.*) *Czernj. and Coss.* (*Sinapis juncea* L.). Glen Innes district. NSW.

Capsella *Medic.*

***C. bursa-pastoris** (*L.*) *Medic.* Widespread and very common. NES 3015.

Cardamine *L.*

C. intermedia *Hook.* Wright's Lookout, near Point Lookout. NEU.

C. lilacina *Hook.* Puddledock Road, N of Armidale. CSA.

Erophila *DC.*

E. verna (*L.*) *Besser.* (*Draba verna* L.). Chiswick, 10 miles S of Armidale. JB.

Hirschfeldia *Moench*

***H. incana** (*L.*) *Lagrèze-Fossat.* (*Brassica incana* (L.) F. Schultz; *B. adpressa* Boiss.). Armidale township, fairly common on roadsides and waste places. NES 3887.

Lepidium *L.*

***L. bonariense** *L.* Armidale township; fairly common on waste places and rubbish dumps in the vicinity of towns. NES 3864 etc.; NSW.

L. hyssopifolium *Desv.* Armidale and Inverell townships, fairly common on roadsides and waste places. NES 1608 etc.; NSW.

Raphanus *L.*

***R. raphanistrum** *L.* 2 miles N of Tenterfield in railway line enclosure. NES 3721.

Rorippa *Scop.*

R. islandica (*Oeder.*) *Borbás.* Blue Hole, 9 miles SE of Armidale. NEU.

***R. microphylla** (*Boenn. ex Reichb.*) *Hylander ex A. et D. Löve.* (*Nasturtium microphyllum* Boenn. ex Reichb.; *N. uniseriatum* Howard and Manton). Ebor Falls; Tilbuster Creek, N of Armidale. NEU; NSW.

R. nasturtium-acquaticum (*L.*) *Hayek.* (*Sisymbrium nasturtium-aquaticum* L.; *Nasturtium officinale* R.Br.). Ben Lomond. NSW.

Rorippa sp. (*Cardamine laciniata* F. Muell.; *Nasturtium laciniatum* (F. Muell.) O. E. Schulz.). Clifton, W of Tenterfield. NSW.

Sisymbrium *L.*

***S. officinale** (*L.*) *Scop.* (*Erysimum officinale* L.). Armidale township; fairly common on waste places and rubbish dumps in towns. NES 3432.

Thlaspi *L.*

***T. arvense** *L.* Guyra; Glen Innes. NSW; BRI.

Turritis *L.*

***T. glabra** *L.* (*Arabis glabra* (L.) Bernh.). New England Highway, 1 mile N of Guyra, on roadside; not common. Turner records the species from Black Mountain. NES 3460.

RESEDACEAE

Reseda *L.*

***R. luteola** *L.* 1 mile N of Guyra on New England Highway, roadside, not common. NES 3410.

DROSERACEAE

Drosera *L.* (See Diels 1906.)

D. auriculata *Backh. ex Planch.* Glen Elgin. CANB.

D. binata *Labill.* Gibraltar Range, 40 miles NE of Glen Innes, in swampy peat area near stream; rare. NES 3180.

D. burmannii *Vahl.* (*D. Burmanni* Vahl.). Glen Elgin; Glen Elgin to Dundee. NES 3831; CANB.

D. peltata *Sm.* Widespread and fairly common in damp situations. NES 1778 etc.

D. spathulata *Labill.* Fairly widespread but of somewhat sparse occurrence. NES 2935.

CRASSULACEAE

Crassula *L.*

C. helmsii (*Kirk*) *Berger.* (*C. recurva* (Hook. f.) Ostenf.). Llangothlin area; Parlour Mountains, Booroolong area; Walcha area; generally found in moist situations; not common. NES 3878; NSW.

C. pedicellosa (*F. Muell.*) *Ostenf.* Stony Creek, N of Wellingrove; rare. NES 3493.

C. sieberiana (*Schultes*) *Druce.* (*Tillaea sieberiana* Schultes; *T. verticillaris* DC.). Widespread and common throughout the area, especially in hilly granite country. NES 2172 etc; NEU.

PITTOSPORACEAE

Billardiera *Sm.*

B. scandens *Sm.* Fairly widespread, but of sparse occurrence. NES 2429 etc.

Bursaria *Cav.*

B. longisepala *Domin.* Apsley Falls; Yarrowitch. NSW.

B. spinosa *Cav.* Widespread and common. NES 96.

Cheiranthera *A. Cunn.*

C. linearis *A. Cunn.* (*C. filifolia* Turcz.). Wallangarra; Jennings; Jennings to Boonoo Boonoo; Howell; Abington area; Turner records this species from Dumaresq; very sparse. NES 3075; NSW. (Baker 1897; Maiden 1906.)

Marianthus *Hueg.*

M. procumbens (*Hook.*) *Benth.* Booroolong to Longford. NES 2848.

Pittosporum *Soland. ex Gaertn.* (See Cooper 1956.)

P. undulatum *Vent.* Tenterfield area. Generally found in Rain Forest communities, but occasionally in wet gullies some distance from their margins, on the eastern edge of the area.

CUNONIACEAE

Callicoma *Andr.*

C. serratifolia *Andr.* Vicinity Little Mt. Spirabo, growing at the heads of wet gullies. NES 2737.

ROSACEAE

Acaena *L.*

A. anserinifolia (*J. R. & G. Forst.*) *Druce.* (*A. sanguisorbae* Vahl.). Fairly widespread and fairly common. NES 1442 etc.

A. ovina *A. Cunn.* Widespread and common. NES 2330 etc.

Agrimonia *L.*

***A. eupatoria** *L.* Wallangarra; 9 miles S of Guyra; Walcha. NSW.

Aphanes *L.* (See Rothmaler 1955.)

***A. arvensis** *L.* "Elmgrove" Guyra. NSW.

A. australiana *Rothm.* Chiswick, 10 miles S of Armidale; not common. JB.

Geum *L.*

G. urbanum *L.* Ebor Falls. NEU.

Poterium *L.*

***P. polygamum** *Waldst. and Kit.* Arding, 8 miles S of Armidale; on roadside. NES 3027.

Rosa *L.*

***R. bracteata** *Wendl.* Armidale; 3 miles S of Tenterfield on New England Highway, growing on side of road. NES 3817; NSW.

***R. rubiginosa** *L.* Widespread and common, growing on a wide variety of soils. NES 2056.

Rubus *L.*

R. parvifolius *L.* Fairly widespread, but of somewhat sparse occurrence. NES 2122.

***R. vulgaris** *Weihe et Nees.* Widespread and common on roadsides, waste places, near creeks, etc.

MIMOSACEAE

Acacia *Mill.*

A. adunca *A. Cunn. ex G. Don.* (*A. accola* Maiden and Betche). Wallangarra. (Maiden and Blakely 1926.)

A. armata *R.Br.* NE of Abington; rare. NES 1976.

A. betchei *Maiden and Blakely.* Type from Wallangarra; Jennings to Boonoo Boonoo; Bismuth; 4 miles N of Torrington; Torrington; Wallangarra; grows in very hilly granite country. NES 3736 etc.; NSW. (Maiden and Blakely 1926.)

A. botrycephala (*Vent.*) *Desf.* Gibraltar Range, 40 miles NE of Glen Innes; 4 miles N of Torrington, hilly granite country. According to Miss Tindale of the N.S.W. National Herbarium, two subspecies may be involved in the area. NES 25, 3089.

A. brownii *Steud. ex DC.* (*A. juniperina* (Vent.) Willd. var. *brownii* (Steud. ex DC.) Benth. Doughboy Range, Ebor area. NES 2090.

A. buxifolia *A. Cunn.* Parlour Mountains, Booroolong area; Tingha to Tenterden; fairly common on hills of porphyry and quartzite in the western half of the area. NES 163 etc.

A. cunninghamii *Hook.* Mingoola Dam site, app. 40 miles W of Tenterfield; not common. NES 2538.

A. dawsonii *R. T. Baker.* (*A. Dawsoni* R. T. Baker.) Mihi area, Gostwyck to Enmore; on Armidale-Wollomombi road, N of Hillgrove. NES 162 etc.

A. dealbata *Link.* Fairly widespread and fairly common. NES 3423 etc.

A. decora *Reichb.* 8 miles W of Watson's Creek; Bundarra; Inverell area. NES 168 etc.; NSW.

A. doratoxylon *A. Cunn. in Field.* Pindari area. NES 1954.

A. falcata *Willd.* Booroolong Creek, on Bundarra road; Yarrowyck and Abington areas. NES 2588 etc.; NEU.

A. falciformis *DC.* (*A. penninervis* Sieb. ex DC. var. *falciformis* (DC.) Benth.). Doughboy Range, Ebor area; Wongwibinda; Backwater; fairly common in granite hill country in the eastern half of the area. NES 1405 etc.

A. filicifolia *Cheel and Welch.* Baldersleigh; Walcha; Torrington; Howell; Wollomombi; Wandsworth; Tia; Glen Elgin to Dundee; etc.; widespread and fairly common. NES 3830 etc.; NSW.

A. fimbriata *A. Cunn. ex G. Don.* Kookabookra to Ward's Mistake; 9 miles N of Glen Innes; not common. NES 1499 etc.

A. flexifolia *A. Cunn. ex Benth.* Bundarra area. NES 1982.

A. floribunda (*Vent.*) *Willd.* Murson Creek, Boonoo Boonoo to Wilson's Downfall; Wilson's Downfall. NES 3756; CANB.

A. glaucescens *Willd.* Wollomombi Falls, top of gorge. NES 2512.

A. granitica *Maiden.* (*A. doratoxylon* A. Cunn. in Field, var. *ovata* Maiden and Betche). Howell; Moredun Creek; Wallangarra; Bismuth, NW of Torrington; hilly granite country. NSW. (Maiden 1920.)

A. hispidula *Willd.* 4 miles N of Torrington; Silent Grove, N of Torrington; a rare species, growing in hilly granite country. NES 2564 etc.

A. implexa *Benth.* Fairly widespread and fairly common. NES 29 etc.

A. irrorata *Sieb. ex Spreng.* Wollomombi. NSW.

A. ixiophylla *Benth.* (*A. fuliginea* R. T. Baker). 11 miles E of Ashford, on road to Pindari; fairly plentiful in porphyry hill country between Pindari and Ashford. NES 2393 etc.

A. lanigera *A. Cunn.* sens. lat. Torrington area; Doughboy Range, Ebor area; very variable. NES 34 etc.

A. leptoclada *A. Cunn. ex Benth.* 3 miles W of Wandsworth; Limestone Creek, Tingha to Tenterden; Gilgai; Pindari to Ashford; S of Emmaville; generally on porphyry hill country in the western half of the area. NES 93 etc.

A. longifolia (*Andrews*) *Willd.* Track between Jennings and Boonoo Boonoo, granite hill country. NES 3737.

A. mcnuttiana *Maiden and Blakely.* Type from Bismuth, NW of Torrington; Torrington. CANB. (Maiden and Blakely 1926.)

A. melanoxylon *R.Br.* Fairly common, mainly in the eastern half of the area. NES 1406.

A. mitchellii *Benth.* (*A. Mitchelli* Benth.). Round Mountain, Guy Fawkes area; Gibraltar Range, 40 miles NE of Glen Innes, near peaty swamp in very acid granite country. NES 3226; NSW. (Maiden 1919.)

A. montana *Benth. in Hook.* 7 miles W of Yarrowyck, in gully near the base of a granite hill; rare. NES 2592.

A. myrtifolia (*Sm.*) *Willd.* Tenterfield to Boonoo Boonoo; rare. NES 3820.

A. neriifolia *A. Cunn. ex Benth.* Common in hilly granite areas, mainly in the western half of the area. NES 1975 etc.

A. obtusifolia *A. Cunn. in Field.* (*A. intertexta* Sieb. ex DC.). Tia Falls, top of gorge. NES 2005.

A. penninervis *Sieb. ex DC.* Torrington; Howell; 7 miles W of Yarrowyck. NES 72 etc.; CANB.

A. pruinosa *A. Cunn. ex Benth.* (*A. spectabilis* A. Cunn. ex Benth. var. *stuartii* Benth.). Balala area; 3 miles S of Torrington; Inverell to Sapphire; granite hills in the western half of the area. NES 59 etc.

A. rubida *A. Cunn. in Field.* 4 miles N of Deepwater; 7 miles E of Dundee; Parlour Mts., Booroolong area, etc.; fairly common in hilly country from Tenterfield to Armidale. In the Parlour Mountains it frequently flowers in the bi-pinnate stage. NES 3844 etc. (Cambage 1914.)

A. ruppii *Maiden and Betche.* Torrington; Silent Grove, N of Torrington. NES 170 etc.

A. siculiformis *A. Cunn. ex Benth.* Apsley Falls; Backwater; Doughboy Ranges from Wongwibinda to Ebor; generally near streams in hilly granite country. NES 1557 etc.; NSW.

A. spectabilis *A. Cunn. ex Benth.* Emmaville; Howell; Torrington. (Maiden 1906; Cambage 1908.)

A. stricta (*Andrews*) *Willd.* Longford; Wilson's Downfall. NES 2504; NSW.

A. triptera *Benth.* Howell. NES 1659.

A. ulicifolia (*Salisb.*) *Court.* (*A. juniperina* (Vent.) Willd.). Torrington area. NES 33 etc.

A. undulifolia *A. Cunn. ex G. Don.* Inverell-Tingha road. CANB.

A. venulosa *Benth.* 5 miles SW of Uralla; Turner records the species from E of Elsmore. NES 2735.

A. viscidula *Benth.* Torrington; Backwater. NES 71; NSW.

A. vomeriformis *A. Cunn. ex Benth.* Doughboy Range, Ebor area; Parlour Mountains, Booroolong area. NES 1502 etc.

Acacia sp. aff. **A. pycnostachya** *F. Muell.* Hillgrove Falls. NEU.

CAESALPINIACEAE

Cassia *L.*

C. sophera *L.* 8 miles N of Inverell on Ashford road; on roadside. NES 2384.

PAPILIONACEAE

Aotus *Sm.*

A. subglauca *Blakely and McKie.* Type from Parlour Mountains, Booroolong area; Torrington area; Pheasant Mountain, Backwater area; Wandsworth; Bismuth; Jennings; Boonoo Boonoo; fairly widespread, found on granite and porphyry hills. NES 57 etc. (Blakely and McKie 1930.)

A. subglauca *Blakely and McKie* var. **filiformis** *Blakely and McKie.* Tingha. (Blakely and McKie 1930.)

Bossiaea *Vent.*

B. buxifolia *A. Cunn.* Emmaville. NSW.

B. microphylla *Sm.* Torrington area. NES 35.

B. neo-anglica *F. Muell.* Vicinity of Little Mt. Spirabo; Yarrow Creek area; Gilgai, S of Inverell; Doughboy Range, Ebor area. NES 2607 etc.

B. prostrata *R.Br.* Ranger's Valley to Tent Hill, in *Casuarina luehmannii-Eucalyptus hemiphloia* assoc. on soil derived from granite; fairly rare. Turner records the species from Lode Hill. NES 3821.

B. rhombifolia *Sieb. ex DC.* Pheasant Mountain, Backwater area; not common. NES 3907.

B. scortechinii *F. Muell.* Jennings; Torrington; Tingha. NSW.

Bossiaea sp. aff. **B. scortechinii** *F. Muell.* Boonoo Boonoo; Jennings; Torrington; Tingha; Round Mt., Guy Fawkes area.

Crotalaria *L.*

C. mitchellii *Benth.* (*C. Mitchelli* Benth.). Maryland to Wylie Creek; Boonoo Boonoo; Wallangarra. NES 3767; NSW.

Daviesia *Sm.*

D. acicularis *Sm.* Torrington; Pheasant Creek, Glen Elgin area. NSW.

D. buxifolia *Benth.* Boonoo Boonoo; Glen Innes.

D. corymbosa *Sm.* form. 2 miles N of Boonoo Boonoo, *Eucalyptus pauciflora-E. mannifera* association in granite valley. NES 3187 etc.

D. genistifolia *A. Cunn.* Fairly widespread, but of somewhat sparse occurrence. NES 142 etc.

D. latifolia *R.Br.* Fairly widespread and fairly common, somewhat variable in width of leaf. NES 2223 etc.

D. pubigera *A. Cunn. ex Benth.* (*D. recurvata* Maiden and R. T. Baker). Howell, hilly granite country. (Maiden and Betche 1905.)

D. ulicifolia *Andr.* (*D. ulicina* Sm.). Doughboy Range, Ebor area; Parlour Mountains, Booroolong area; Torrington; Bismuth; Yarrowitch; Tia. NES 1515; NSW.

D. umbellulata *Sm.* Torrington to Silent Grove, *Eucalyptus andrewsii* association on top of granite hill; not common. NES 2552.

Desmodium *Desv.*

D. brachypodum *A. Gray.* N of Carlisle's Gully, New England Highway; Mingoola Dam site, Severn River, 40 miles W of Tenterfield. NES 2601 etc.

D. varians (*Labill.*) *G. Don.* Very variable; widespread and common. NES 2378 etc.

Dillwynia *Sm.* (See Blakely 1939.)

D. juniperina *Lodd.* Fairly widespread, but of somewhat sparse occurrence. NES 1811 etc.; NEU; CANB.

D. retorta (*Wendl.*) *Druce* var. **phylicoides** (*A. Cunn.*) *J. Thompson* sens. lat. (*D. phylicoides* (A. Cunn.) Benth.). Torrington; Parlour Mountains, Booroolong area, on porphyry hill country; also in hilly granite country in the eastern half of the area e.g., top of Pheasant Mountain, Backwater area; Wongwibinda, *Eucalyptus radiata-E. acaciiformis* association; Yarrow Creek, *E. mannifera* association; Doughboy Range, Ebor area, in *E. radiata-E. acaciiformis* assoc.; not common. NES 3463 etc.

D. sericea *A. Cunn.* var. **sericea.** Gilgai, on granite hill, Howell; Guyra. NES 2357.

D. sericea *A. Cunn.* var. **glabriflora** *Blakely.* Wallangarra. NSW.

Glycine *L.*

G. clandestina *Wendl.* Very variable, widespread and common. NES 2810 etc.

G. tabacina (*Labill.*) *Benth.* Very variable, widespread and common. NES 2838 etc.

Gompholobium *Sm.*

G. glabratum *Sieb. ex DC.* (includes *G. uncinatum* A. Cunn. ex Benth.). Bismuth. NSW.

G. huegelii *Benth.* Torrington; Howell; Wongwibinda. NES 76 etc., (Maiden 1906).

G. latifolium *Sm.* Gibraltar Range, 40 miles NE of Glen Innes. NES 3087.

Goodia *Salisb.*

G. lotifolia *Salisb.* Vicinity Little Mt. Spirabo. NES 2754.

Hardenbergia *Benth.*

H. violacea (*Schneev.*) *Stearn.* (*H. monophylla* (Vent.) Benth.). Fairly widespread and fairly common, generally on rocky hillsides. NES 2068 etc.

Hovea *R.Br.*

H. acutifolia *A. Cunn. ex G.Don.* Gibraltar Range, 40 miles NE of Glen Innes, acid granite. NES 3086.

H. heterophylla *A. Cunn. ex Hook. f.* Doughboy Range, Ebor area. NES 1530 etc.; NEU.

Hovea sp. An apparently unnamed species, fairly common in the western half of the area, on granite and porphyry hills, e.g., Baldersleigh area; Silent Grove to Torrington; Torrington area; Yarrowyck area. NES 65 etc.

Hovea sp. (*H. lanceolata* auct. austr.). This taxon shows considerable variation and is in need of revision. NES 2392 etc.; NSW.

Indigofera *L.*

I. australis *Willd.* sens. lat. Fairly widespread but of somewhat sparse occurrence; very variable. NES 1803 etc.

I. australis *Willd.*, var. **signata** *F. Muell. ex Benth.* Fairly widespread and fairly common. NES 1402 etc.

Jacksonia *R. Br.*

J. scoparia *R. Br.* Fairly widespread, but of somewhat sparse occurrence. NES 1840.

Kennedia *Vent.*

K. rubicunda (*Schneev.*) *Vent.* 7 miles NE of Tenterfield on Boonoo Boonoo road, granite hill with *Eucalyptus campanulata* association. NES 2466.

Lathyrus *L.*

***L. sphaericus** *Retz.* Armidale area; not common. NES 2062.

Lespedeza *Rich.*

L. juncea (*L.f.*) *Pers.* ssp. **sericea** (*Thunb.*) *Steen.* Fairly widespread but of sparse occurrence. NES 2260 etc.

Lotus *L.*

L. australis *Willd.* Somewhat variable. Vicinity of Little Mt. Spirabo; Armidale and Dangarsleigh areas; fairly widespread but of somewhat sparse occurrence. NES 2768 etc.

* **L. corniculatus** *L.* Ben Lomond area, not common. NES 3204.

Medicago *L.*

***M. denticulata** *Willd.* Widespread and common. NES 1632 etc.

***M. lupulina** *L.* Fairly common in the Guyra area, e.g., in the fenced off area adjoining the railway line etc. NES 3146 etc.

***M. minima** (*L.*) *Bartal.* Common in the western half of the area. NES 2032 etc.

***M. orbicularis** (*L.*) *Bartal.* Fairly common in the Inverell and Ashford areas. NES 3007.

***M. sativa** *L.* Used as a fodder plant in the western half of the area, occasionally spontaneous on roadsides, near towns and areas of old cultivation.

Melilotus *Mill.*

***M. alba** *Medic.* Armidale and Guyra areas, on roadsides and in the fenced off areas adjoining the railway line. NES 3147.

***M. indica** (*L.*) *All.* (*M. parviflora* Desf.). Torrington; Inverell; Tenterfield. NSW.

***M. officinalis** (*L.*) *Lam.* (*M. arvensis* Wallr.). Armidale. NEU.

Mirbelia *Sm.*

M. aotoides *F. Muell.* Boonoo Boonoo; Pheasant Mountain, Backwater area; Backwater; Pheasant Creek, Glen Elgin; hilly granite country, not common. NES 3462 etc.; NSW. (Maiden and Betche 1905.)

M. pungens *A. Cunn. ex G.Don.* Jennings; Torrington; Tenterfield; Backwater. NSW.

M. rubiifolia (*Andr.*) *G. Don.* (*M. reticulata* Sm.). Torrington area. NES 50.

M. speciosa *Sieb. ex DC.* Torrington; Howell; Parlour Mountains, Booroolong area; hilly granite and porphyry country, not common. NES 133 etc. (Maiden 1906; Cambage 1908.)

Oxylobium *Andr.*

O. ilicifolium (*Andr.*) *Domin.* (*O. trilobatum* Benth.). Doughboy Range, Ebor area; Tia Falls; Turner records the species from N of Tenterfield; not common. NES 2923 etc.

Phyllota *DC.*

P. phylicoides (*Sieb. ex DC.*) *Benth.* Wilson's Downfall; Boonoo Boonoo; Pheasant Creek, Glen Elgin area; hilly granite country. NSW.

Psoralea *L.*

Psoralea sp. aff. **P. adscendens** *F. Muell.* Fairly widespread, but of sparse occurrence. CSA; NSW.

Pultenaea *Sm.* (See Williamson 1920-1928.)

P. cambagei *Maiden and Betche.* Type from Torrington; Deepwater. (Maiden and Betche 1908.)

P. campbellii *Maiden and Betche.* Type from Grave Yard Creek, near Walcha; Longford, porphyry hill country, *Eucalyptus andrewsii* association; Baldersleigh, porphyry hill country, *E. andrewsii association.* NES 2846 etc. (Maiden and Betche 1899.)

P. cunninghamii (*Benth.*) *H. B. Williamson.* (*P. ternata* F. Muell.). 7 miles W of Yarrowyck, *Euc. macrorhyncha* assoc. on granite hill. NES 2155.

P. flexilis *Sm.* 7 miles NE of Tenterfield on road to Boonoo Boonoo, granite hill country with *Eucalyptus campanulata.* NES 2465.

P. foliolosa *A. Cunn. ex Benth.* Howell; 7 miles W of Yarrowyck, on Toryburn road. NES 2707; NSW.

P. hartmanii *F. Muell.* Jennings; Yellow Gap, NE of Guyra. NSW.

P. microphylla *Sieb. ex DC.* Widespread and fairly common. NES 1764 etc.; NSW.

P. obovata *Benth.* Moona River, Walcha area. (Williamson 1920.)

P. pycnocephala *F. Muell.* Tenterfield. (Williamson 1920.)

P. stuartiana *H. B. Williamson.* Type from Tenterfield; Bismuth; Silent Grove, Torrington area. NSW. (Williamson 1920.)

P. subspicata *Benth.* Apsley Falls. NSW.

Pultenaea sp. An apparently unnamed species, fairly common in hilly porphyry and quartzite country, in the western half of the area. e.g., Ashford to Strathbogie; Gilgai; Parlour Mountains, Booroolong area; Yarrowyck area. NES 2074 etc.

Rhynchosia *Lour.*

R. minima (*L.*) *DC.* Inverell area. NES 2802.

Robinia *L.*

***R. pseudoacacia** *L.* Spreads by suckering in towns and near old homesteads.

Sarothamnus *Wimm.*

***S. scoparius** (*L.*) *Wimm. ex Koch.* (*Cytisus scoparius* (L.) Link.) Clumps on roadside near Llangothlin. NES 3487.

Swainsona *Salisb.* (See Lee 1948.)

S. brachycarpa *Benth.* Maryland; Boonoo Boonoo; Tenterfield; Guy Fawkes; Point Lookout; Ebor Falls. NEU. (Lee 1948.)

S. galegifolia (*Andr.*) *R.Br.* (*S. coronillifolia* Salisb.). Tenterfield; Ashford; 5 miles S of Inverell, on basalt ridge; Copeton, on basalt ridge; 6 miles S of Kentucky turnoff on New England Highway, on soil derived from granite. NES 131 etc.

S. greyana *Lindl.* ssp. **greyana.** Inverell. (Lee 1948.)

S. monticola *A. Cunn. ex Benth.* Glen Innes; Armidale. (Lee 1948.)

S. oroboides *F. Muell. ex Benth.* ssp. **oroboides.** Lectotype from Clifton, New England; Tenterfield; Jennings; Ashford; Glen Innes; Guy Fawkes. (Lee 1948.)

S. oroboides *F. Muell. ex Benth.* ssp. **reticulata** (*J. M. Black*) *A. Lee.* Widespread and common. NES 2326 etc.

S. parviflora *Benth.* Fairly widespread, but of sparse occurrence; for localities see Lee 1948. NES 2268 etc.

Templetonia *R. Br.*

T. stenophylla (*F. Muell.*) *J. M. Black.* (*T. muelleri* Benth.). Abington area, *Eucalyptus hemiphloia* association on quartzite hill. NES 2830.

Trifolium *L.*

***T. arvense** *L.* Widespread and common.

***T. campestre** *Schreb.* (*T. procumbens* auct.). Widespread and common. NES 1786 etc.

***T. dubium** *Sibth.* (*T. minus* Sm.). Glen Elgin. CANB.

***T. glomeratum** *L.* Fairly widespread and fairly common.

***T. incarnatum** *L.* Used as an improved pasture species in the area.

***T. pratense** *L.* Used as an improved pasture species in the area; occasionally spontaneous, e.g., Armidale township on roadsides. NES 3448.

***T. repens** *L.* Widespread and common.

***T. scabrum** *L.* Armidale area; naturalised.

***T. subterraneum** *L.* An important improved pasture species in the area; occasionally spontaneous.

Vicia *L.*

***V. angustifolia** (*L.*) *Reichard.* Walcha Road. NSW.

***V. sativa** *L.* Inverell. NSW.

***V. villosa** *Roth.* Glen Innes area. NSW.

Zornia *Gmel.*

Z. diphylla (*L.*) *Pers.* Fairly widespread and fairly common. NES 2692 etc.

GERANIACEAE

Erodium *L'Hérit.* (See Carolin 1958.)

***E. cicutarium** (*L.*) *L'Hérit.* Common in native pastures throughout the area. NES 2077.

E. crinitum *Carolin.* Fairly common on roadsides in the north-western portion of the area. NES 2031.

***E. moschatum** (*L.*) *Ait.* New England Highway, 10 miles S of Armidale, on roadside; Turner records the species from Kentucky; not common. NES 3001.

Geranium *L.*

***G. molle** *L.* Yarrowyck area; not common. NES 2115.

G. pilosum *Forst. f.* sens. lat. Extremely variable, widespread and common throughout the area. NES 2245 etc.

Pelargonium *L'Hérit.*

P. inodorum *Willd.* Doughboy Range, Ebor area; Balala area; Yarrowyck area; generally found near the tops of granite hills. NES 2150 etc.

OXALIDACEAE

Oxalis *L.*

O. corniculata *L. sens. lat.* Widespread and common. NES 2372 etc.

***O. martiana** *Zucc.* (*O. corymbosa* DC.) Armidale township; a common weed in gardens and waste places. NES 3446.

LINACEAE

Linum *L.*

L. marginale *A. Cunn. ex Planch.* Guyra area, in the fenced off area adjoining the railway line; not common. NES 3161.

***L. usitatissimum** *L.* A few plants growing on the railway crossing on the Rangers Valley road. NES 3908.

ZYGOPHYLLACEAE

Tribulus *L.*

T. terrestris *L.* Inverell area; Abington. NES 2796; CSA.

RUTACEAE

Asterolasia *F. Muell.*

A. asteriscophora (*F. Muell.*) *Druce.* Parlour Mountains. NEU.

Boronia *Sm.*

B. algida *F. Muell.* Silent Grove, Torrington area; Tungsten; Bismuth; Pheasant Creek, Glen Elgin area; Gibraltar Range, 40 miles NE of Glen Innes. NSW; NEU; NES 3224.

B. anethifolia *A. Cunn.* (*B. anemonifolia* A. Cunn. var. *anethifolia* Benth.). Howell. NSW.

B. bipinnata *Lindl.* Bismuth; Torrington. NSW. (Cheel 1928.)

B. dentigeroides *Cheel.* Boonoo Boonoo; Backwater; Guyra area. NSW.

B. granitica *Maiden and Betche.* Torrington; Bismuth; Howell; Emmaville. NSW. (Maiden and Betche 1905.)

B. ledifolia *J. Gay.* Torrington. (Wakefield 1955.)

B. microphylla *Sieb. ex Spreng.* Boonoo Boonoo; Deepwater; Longford area; Torrington; Tingha area; Emmaville; Parlour Mountains, Booroolong area. NES 2850 etc. (Cheel 1924.)

B. polygalifolia *Sm.* Boonoo Boonoo; Tingha; Moredun Creek; Parlour Mountains, Booroolong area; Turner records the species from Steinbrook. NSW.

B. whitei *Cheel.* Emmaville; Torrington; Tent Hill; Bismuth. NSW. (Cheel 1927.)

Correa *Sm. corr. Andr.*

C. reflexa (*Labill.*) *Vent.* Torrington; Tungsten; Bismuth; Pheasant Creek, Glen Elgin area; Apsley Falls; Guyra area. NES 2089; NSW.

Eriostemon *Sm.*

E. crowei *F. Muell.* var. **exalata** *F. Muell.* Bismuth; Howell. NSW.

E. myoporoides *DC.* Tenterfield; Howell; Turner records this species from Bolivia; Blakely records a variety, var. *acuta* from Wilson's Downfall. NSW. (Blakely 1941.)

Phebalium *Vent.*

P. ambiens (*F. Muell.*) *Maiden and Betche.* Bismuth. NSW.

P. glandulosum *Hook.* var. **eglandulosum** *Blakely.* Torrington. (Blakely 1941.)

P. rotundifolium *Benth.* Wallangarra; Torrington; Howell. NSW.

Zieria *Sm.*

Z. compacta *C. T. White.* 20 miles E of Glen Innes, on Grafton road. NES 3828.

Z. cytisoides *Sm.* Yarrowyck area. NES 2137.

Z. laevigata *Sm.* Torrington; Bismuth; Backwater; Baldersleigh area. NES 2484; NSW.

SIMAROUBACEAE

Ailanthus *Desf.*

***A. altissima** (*Mill.*) *Swingle.* (*A. glandulosa* Desf.) In towns and the vicinity of old homesteads etc., suckers freely.

POLYGALACEAE

Comesperma *Labill.*

C. defoliatum *F. Muell.* Boonoo Boonoo. NSW.

C. ericinum *DC.* Gibraltar Range; Howell. NES 3063. (Maiden 1906.)

C. retusum *Labill.* Guy Fawkes. NSW.

C. sylvestre *Lindl.* Torrington area. NES 68. (Cambage 1908.)

Polygala *L.*

P. veronicea *F. Muell.* (*P. japonica* auct., non Houtt.). Doughboy Range; Ebor Falls; Yarrowyck area; Chiswick, 10 miles S of Armidale. NES 2241 etc.; NEU.

EUPHORBIACEAE

Adriana *Gaudich.*

A. glabrata *Gaudich.* var. **acerifolia** (*Hook.*) *Pax.* Booroolong Creek, 15 miles W of Armidale; Fraser's Creek, on Inverell road. NSW.

Amperea *Juss.*

A. xiphoclada (*Sieb. ex Spreng.*) *Druce.* (*A. spartioides* Brongn.). Dividing Range, 7 miles NE of Tenterfield; Gibraltar Range, 40 miles NE of Glen Innes. NES 2456 etc.

Bertya *Planch.*

B. rosmarinifolia (*A. Cunn.*) *Planch.* Salisbury Waters, S of Dangarsleigh, growing along bank of stream; not common. NES 3127.

Beyeria *Miq.*

B. lasiocarpa *J. Muell.* Tia Falls. NSW.

B. viscosa *Miq.* 10 miles E of Ashford. NES 2398.

Euphorbia *L.*

E. alsiniflora *Baill.* (*E. alsinaeflora* Baill.). Inverell. NSW.

E. drummondii *Boiss.* Widespread and common. NES 2228 etc.

***E. helioscopia** *L.* Armidale, garden weed; rare. NES 3068.

***E. lathyrus** *L.* Armidale, town rubbish dump; Oakey Creek, E of Armidale. NES 3872; NSW.

***E. peplus** *L.* Armidale, shady areas near buildings and waste places in township. NES 2072.

Monotaxis *Brongn.*

M. macrophylla *Benth.* Howell. (Maiden and Betche 1905.)

Phyllanthus *L.*

P. filicaulis *Benth.* Fairly widespread, common. NES 2998 etc.; NEU.

P. gasstroemii *J. Muell.* Yarrowitch. NEU.

P. subcrenulatus *F. Muell.* Guyra; Tingha. NSW.

P. thymoides *J. Muell.* (*P. thymoides* Sieb. nom. nud.). Emmaville; Turner records this species from Hillgrove. NSW.

Poranthera *Rudge*

P. corymbosa *Brongn.* Silent Grove, N of Torrington. NES 2553.

P. microphylla *Brongn.* Widespread and common. NES 2144.

CELASTRACEAE

Maytenus *Molin.*

Maytenus sp. aff. *M. cunninghamii* (Hook.) Loes. Balala area; Yarrowyck area; top of Apsley Falls; not common. NES 113 etc.

STACKHOUSIACEAE

Stackhousia *Sm.*

S. maidenii *Pampanini.* (*S. Maideni* Pampanini). Tia Falls. (Maiden and Betche 1916.)

S. monogyna *Labill.* Widespread and fairly common. NES 1744.

S. viminea *Sm.* Widespread and fairly common. NES 2437 etc.

SAPINDACEAE

Alectryon *Gaertn.* (See Radlkofer 1933.)

A. forsythii (*Maiden and Betche*) *Radlk.* (*Nephelium forsythii* Maiden and Betche.) 5 miles W of Watson's Creek; Tia Canyon; Apsley Canyon; Wollomombi Falls. NES 2513, 2734; NSW. (Maiden and Betche 1901.)

A. subdentatus (*F. Muell. ex Benth.*) *Radlk.* (*Nephelium subdentatum* F. Muell. ex Benth.). Guy Fawkes River; Tenterfield; Kookabookra. NSW. (Radlkofer 1933.)

Dodonaea *L.* (See Radlkofer 1933.)

D. attenuata *A. Cunn.* Armidale Pine Forest. NEU.

D. boroniifolia *G. Don.* (*D. boroniaefolia* G. Don). Tea Tree Creek, Armidale to Yarrowyck. NES 3020.

D. filifolia *Hook.* Wallangarra; Howell. NSW.

D. hirsuta *Maiden and Betche.* Wallangarra; Jennings; Silent Grove, N of Torrington; Torrington. NES 27; NSW. (Maiden and Betche 1905.)

D. rhombifolia *N. A. Wakefield.* Apsley Falls, Walcha district; top of Hillgrove gorge. NEU. (Wakefield 1955.)

D. viscosa (*L.*) *Jacq.* and forms. Very variable, widespread and fairly common.

RHAMNACEAE

Alphitonia *Reiss.* (See Braid 1925.)

A. excelsa (*Fenzl*) *Benth.* Mingoola Dam Site, 40 miles W of Tenterfield; Ashford area; Howell. NES 2534 etc. (Maiden 1906.)

Cryptandra *Sm.*

C. amara *Sm.* Fairly widespread and fairly common. NES 1506.

C. amara *Sm.* var. **floribunda** *Maiden and Betche.* Howell. NES 1687. (Maiden 1906.)

C. amara *Sm.* var. **longiflora** *F. Muell. ex Maiden and Betche.* Parlour Mountains, Booroolong area; Yarrowyck; Gara River; Ebor area. NES 2239; NEU.

C. lanosiflora *F. Muell.* Torrington. CANB.

C. propinqua *A. Cunn. ex Fenzl.* Gara River, 9 miles E of Armidale; Apsley Falls. NSW.

C. scortechinii *F. Muell.* Doughboy Range. NES 2905.

Cryptandra sp. aff. **C. propinqua** *A. Cunn. ex Fenzl.* Inverell area. NES 1949.

Discaria *Hook.*

D. pubescens (*Brongn.*) *Druce.* (*D. australis* Hook. f.). Walcha Road; Glen Innes; Tingha; fairly rare. NSW. (Willis 1955.)

Pomaderris *Labill.*

P. argyrophylla *N. A. Wakefield.* Guyra. NSW.

P. betulina *A. Cunn.* Booroolong. NSW.

P. ferruginea *Sieb. ex Fenzl.* Wallangarra. NEU.

P. lanigera (*Andr.*) *Sims.* Wallangarra. NSW.

P. vellea *N. A. Wakefield.* Torrington. (Wakefield 1951.)

VITACEAE

Cayratia *Juss.*

C. clematidea (*F. Muell.*) *Domin.* Mole River, 7 miles N of Silent Grove, Torrington area. NSW.

ELAEOCARPACEAE

Elaeocarpus *Burm.*

E. holopetalus *F. Muell.* Guy Fawkes. (Maiden and Betche 1910.)

E. reticulatus *Sm.* 7 miles NE of Tenterfield, hilly granite country, in *Eucalyptus campanulata* association. NES 2460.

MALVACEAE

Abutilon *L.*

A. oxycarpum (*F. Muell.*) *F. Muell. ex Benth.* Mingoola Dam site, 40 miles W of Tenterfield. NES 2520.

Hibiscus *L.*

***H. trionum** *L.* Fairly widespread in cultivated areas, and commonly found in corn paddocks in the Armidale area. NES 2817 etc.; NEU; BRI.

Malva *L.*

***M. neglecta** *Wallr.* Cherry Hill, 7 miles NW of Uralla on Bundarra road NSW.

Modiola *Moench*

***M. caroliniana** (*L.*) *G. Don.* Fairly widespread, common on waste places in towns. NES 2064.

Pavonia *Cav.*

P. hastata *Cav.* Form with large flowers and numerous stamens. Gara River, E of Armidale; stony soil near river bank. NEU; CSA.

Form with small cleistogamous flowers and 5 stamens. Maryland area. NES 3768.

Sida *L.*

S. corrugata *Lindl.* Mingoola Dam site, 40 miles W of Tenterfield. NES 2524 etc.

S. subspicata *F. Muell. ex Benth.* Mingoola Dam site, 40 miles W of Tenterfield. NES 2537 etc.

STERCULIACEAE

Brachychiton *Schott et Endl.*

B. populneum *R.Br.* (*Sterculia diversifolia* G. Don.) Widespread but of sparse occurrence.

Keraudrenia *J. Gay*

K. hillii *F. Muell.* Jennings; Boonoo Boonoo. NSW.

Rulingia *R. Br.*

R. pannosa *R.Br.* Howell. NSW.

DILLENIACEAE

Hibbertia *Andr.*

H. acicularis (*Labill.*) *F. Muell.* Somewhat variable; Silent Grove, granite hill with *E. andrewsii* association; Boonoo Boonoo; Emmaville area; Backwater; Yarrowyck area; most commonly found on granite and porphyry hills in the western half of the area, but also found on some granite hills in the eastern half. NES 1650 etc.; NSW.

H. elata *Maiden and Betche.* Wallangarra. (Maiden and Betche 1913.)

H. obtusifolia *DC.* and forms. A variable species, widespread and common. NES 2414 etc.

H. pedunculata *R.Br.* Wilson's Downfall; Boonoo Boonoo. NSW.

H. scandens (*Willd.*) *Gilg.* (*H. volubilis* Andr.). Vicinity of Little Mt. Spirabo; not common. NES 2759.

H. serpyllifolia *R.Br.* Backwater area. NSW.

H. stricta (*DC.*) *F. Muell.* var. **stricta** and forms. Very variable, widespread and fairly common in hilly granite country throughout the area. NES 193 etc.

H. vestita *A. Cunn. ex Benth.* S of Emmaville; Torrington area; hilly granite and porphyry country, not common. NES 2741 etc.; NSW.

HYPERICACEAE

Hypericum *L.*

H. gramineum *Forst. f.* Widespread and common, in a large variety of habitats. NES 2226.

H. japonicum *Thunb.* Little Lagoon, 5 miles S of Guyra; Thomas's Lagoon, SW of Armidale; found in swampy areas on the margins of these lagoons. NES 3139; NEU; JB.

***H. perforatum** *L.* 4 miles E of Glen Innes; 3 miles S of Guyra; not common in the area, generally found as small colonies on roadsides. NES 3201 etc.

ELATINACEAE

Elatine *L.*

E. gratioloides *A. Cunn.* (*E. americana* (Pursh.) Arnott., var. *australiensis* Benth.) Tenterfield; Llangothlin; grows in mud on the edges of swampy areas. NES 3428; NSW.

VIOLACEAE

Hybanthus *Jacq.*

H. monopetalus (*Roem. et Schult.*) *Domin.* (*H. filiformis* (DC.) F. Muell.; *Ionidium filiforme* (DC.) F. Muell.). Armidale, racecourse, Doughboy Range; Balala; Chiswick, 10 miles S of Armidale. NES 2342 etc.

Hymenanthera *R. Br.*

H. dentata R.*Br. ex DC.* (*H. banksii* F. Muell.). Fairly widespread but of sparse occurrence, e.g., top of Bald Nob, near Armidale. NES 181 etc.

Viola *L.*

V. betonicifolia *Sm.* Fairly widespread, fairly common. NES 1792 etc.

V. caleyana *G. Don.* Point Lookout area. NEU.

V. hederacea *Labill.* Wright's Lookout, near Pt. Lookout. NEU.

THYMELAEACEAE

Pimelea *Banks ex Gaertn.*

P. collina *R.Br.* Tingha; Parlour Mountains; Turner records this species from Ben Lomond. NES 1820. (Cambage 1904.)

P. curviflora *R.Br.* and forms. Fairly widespread and fairly common. NES 1710 etc.

P. glauca *R.Br.* Fairly widespread but of somewhat sparse occurrence. NES 2125 etc.

P. linifolia *Sm.* Widespread and common, somewhat variable. NES 1593 etc.

Pimelea sp. aff. **P. pauciflora** *R.Br.* Ashford area; Inverell area. NES 2076 etc.

LYTHRACEAE

Lythrum *L.*

L. hyssopifolia *L.* 10 miles S of Guyra, on roadside; Wollomombi. NES 3207; NEU.

L. salicaria *L.* Glen Elgin; Glen Elgin to Dundee, near swamps in hilly granite country; Yarrow Creek, swampy area in hilly granite country; Guyra to Llangothlin, moist situation in fenced off area adjoining railway line. NES 2718 etc.; NEU; CANB.

MYRTACEAE

Angophora *Cav.*

A. floribunda (*Sm.*) *Sweet.* (*A. intermedia* DC.). Widespread and common; somewhat variable. NES 43.

A. subvelutina *F. Muell.* Bolivia Range; granite ranges E of Tenterfield; Gilgai. NSW.

Baeckea *L.*

B. densifolia *Sm.* Baldersleigh area; Howell; E of Abington; Turner records this species from Brockley. NES 2488 etc.

B. gunniana *Schau.* Doughboy Range; vicinity of Little Mt. Spirabo; Glen Elgin to Dundee. NES 1891 etc.

Callistemon *R. Br.*

C. citrinus (*Curtis*) *Skeels*. (*C. lanceolatus* DC.). Wallangarra; Emmaville; Howell. NES 82; NSW.

C. flavovirens (*Cheel*) *Cheel*. (*C. rugulosus* (Willd. ex Link) DC. var. *flavovirens* Cheel). Silent Grove, N of Torrington; Torrington; Bismuth. NSW.

C. linearis *DC*. Wallangarra; Torrington. NSW.

C. pallidus (*Bonpl.*) *DC*. Tenterfield to Boonoo Boonoo; Backwater; Walcha; Yarrowitch. NES 72; NSW.

C. paludosus *F. Muell*. Maryland to Wylie Creek; Elsmore via Inverell; 5 miles S of Emmaville; Moredun Creek; 12 miles E of Armidale; Apsley River above Apsley Falls; a red-flowered form of this species occurs on the New England. NES 3770; NSW.

C. rigidus *R.Br*. Jennings to Boonoo Boonoo. NES 3739.

C. sieberi *DC*. (*C. pityoides* Miq.). Wallangarra; Jennings; Wilson's Downfall; Boonoo Boonoo; Torrington; Guyra; Guyra to Oban; Round Mountain, Guy Fawkes area. NES 3740; NSW.

C. viminalis (*Soland. ex Gaertn.*) *G. Don ex Loud*. Wallangarra; Boonoo Boonoo. NSW.

Callistemon sp. Deepwater area. NES 2510 etc.

Calytrix *Labill.*

C. tetragona *Labill*. Torrington; Howell; Parlour Mountains, Booroolong area; Baldersleigh area. NES 1809 etc. (Maiden 1906; Cambage 1908.)

Eucalyptus *L'Hérit.* (See Blakely 1934.)

E. acaciiformis *Deane and Maiden*. (*E. acaciaeformis* Deane and Maiden). Fairly common on the eastern margin of the area from Tenterfield to Yarrowitch. Most abundant in association with *Eucalyptus radiata*, on the montane granite country from Bald Nob, 20 miles NE of Glen Innes, through Mt. Mitchell, Oban, the Doughboy Range and through Yooroonah to Jeogla. In the southern part of the area it is again fairly abundant from Moona Plains to Yarrowitch, and occurs somewhat more sparsely in the Enmore, Winterbourne, Oorundunby and Branga area. *E. crawfordii* Maiden and Blakely, a suspected hybrid between *E. acaciiformis* and *E. saligna*, is recorded by Blakely from Moona Plains, Walcha. NES 3263 etc.

E. affinis, Deane and Maiden. See *E. sideroxylon*.

E. albens *Benth*. Fairly common in the north-western portion of the area, from Swan Vale to Inverell, from Inverell to Bukkulla and Pindari, and from Rocky Creek to Strathbogie. Also common in the area from Balala to Toryburn. Isolated occurrences are to be found 10 miles S of Bundarra, on the road to Toryburn, and 12 miles W of Armidale, on the road to Yarrowyck. The species is very common in the country adjoining the New England Tablelands on the western side. Not found in the eastern half of the area.

E. amplifolia *Naudin*. Fairly common in the south-eastern corner of the area from Jeogla, through Wollomombi, Ponds Creek, on the Armidale-Wollomombi road, E of Hillgrove and Mihi, Enmore, and NE of Winterbourne. Also on the range 4 miles NW of Yarrowitch. Elsewhere the species can be expected on the eastern-most edge of the area, and the occurrences at Tingha and Howell quoted by Blakely were not observed during the survey. Although sometimes difficult to separate from some forms of *E. blakelyi* on herbarium material, the species is more easily distinguished in the field by the juvenile leaves which are larger, more undulate and luxurious, and grow with the plane of the leaf blade horizontal to the ground, whereas those of *E. blakelyi* are smaller, flatter, and have the petiole twisted so that plane of the leaf blade is generally vertical to the ground. NES 3388 etc. *E. amplifolia* Naudin var. *sessiliflora* Blakely is fairly common in the Tenterfield area. NES 3371.

E. andrewsii *Maiden.* (*E. Andrewsi* Maiden). Common in the western half of the area on hilly granite and porphyry country, e.g. the Silent Grove, Torrington and Emmaville areas, Gilgai, Stannifer, Howell and Tingha, southward through Baldersleigh to the Parlour Mountains and from Hurricane Hill to south of Fladbury. The small occurrences in the eastern half of the area are difficult to separate from the closely related *E. campanulata* which is very common along the eastern margin of the area. The eastern occurrences of this form of *E. andrewsii* are as follows: Kingsgate; Pheasant Mountain, NE of Backwater; 6 miles E of Armidale, on the Wollomombi road; and S of Surveyor's Creek. It is doubtful whether these two species should be kept separate. See Anderson 1957.

E. auburnensis Maiden. See *E. melanophloia.* NES 1977.

E. bancroftii *Maiden.* (*E. Bancrofti* Maiden). Common in hilly granite and porphyry country in the western half of the area. Generally on skeletal soils near the tops of hills, and often forms associations with *E. youmanii* and *E. dealbata.* Very common in the rugged country in the Tingha, Howell, Gilgai and Stannifer area and in that adjoining the Severn River from S of Fladbury, through Strathbogie and Hurricane Hill and NW towards Ashford; from Emmaville through Torrington, Stannum and Silent Grove, and north-eastwards to the ranges near Jennings. In the south it is fairly common, again in similar country, from Tingha, Bundarra through Baldersleigh, Parlour Mountains, Yarrowyck, Balala, NE of Retreat, Longford, Rocky Gully, the Moonbi Range NW of Bendemeer, and the Nandewar Range S of Balala. NES 3387 etc.

E. banksii *Maiden.* Common in the western half of the area in hilly granite and porphyry country, and often found growing in association with *E. andrewsii.* The main distribution is as follows: On the granite ranges at Wallangarra and Wilson's Downfall; S of Fladbury and westward to Strathbogie and Hurricane Hill; the Gilgai, Howell, Stannifer and Tingha areas, and from Tingha through Baldersleigh to the Parlour Mountains. Two interesting remnants occur in the south-eastern portion of the area, the first on a small area of hilly conglomerate country, partly overlain by basalt, 9-11 miles N of Armidale, and the second between Mihi Falls and Enmore. NES 3266 etc.

E. baueriana *Schauer.* A few trees near an old church on the outskirts of Hillgrove township and similar small occurrences south of Mihi Falls (on Gostwyck-Enmore road,) and N and NW of Enmore. The species is somewhat more plentiful just off the tablelands on the Long Point road approximately 8 miles SE of Hillgrove. Blakely records the species from Wallangarra. NES 1420 etc.

E. blakelyi *Maiden.* Widespread and common throughout the area, generally found in association with *E. melliodora.*

E. bridgesiana *R. T. Baker.* (*E. stuartiana* auct. non F. Muell.) Widespread and common throughout the area. In the area between the Nandewar and Moonbi Ranges from Retreat to Campfire and including Longford, Bendemeer, Woolbrook, Walcha Road, Surveyors Creek etc., extensive hybridisation has apparently taken place between this species and *E. malacoxylon.* The resulting hybrid swarm is very variable, however the fruits and buds of the hybrids are generally intermediate between those of the two suspected parents. NES 9 etc.

E. caleyi *Maiden.* Restricted to hilly granite, porphyry and quartzite country in the western half of the area, and often found growing in association with *E. dealbata*. The main areas of occurrence are as follows: From Gilgai to Howell, eastwards to Tingha, and south-west to Tienga Creek (N of Bundarra). Also in the country between Baldersleigh, Toryburn, Kingstown and Abington. NES 3331 etc.

E. caliginosa *Blakely et McKie*, sens. lat. Widespread and very common throughout the area. A variable complex including in this sense *E. cyathiformis* Blakely and McKie, and possible hybrids and hybrid swarms with various other stringybarks in the area. Generally found in shallow soils on hills or in hilly country.

E. callanii Blakely. See *E. pauciflora*. NES 1449 etc.

E. camaldulensis *Dehn.* (*E. rostrata* Schlecht.) Restricted to the banks of rivers on the western margin of the area e.g. the Bundarra River at Bundarra.

E. cameronii *Blakely and McKie.* (*E. Cameroni* Blakely and McKie.) Type from Diehard State Forest, 25 miles E of Glen Innes. Common in the area adjoining the New England Tablelands on the eastern side, and sometimes found on the extreme eastern scarp edge of the tablelands e.g. NE of Wongwibinda; Jeogla; Long Point road, SE of Hillgrove; Moona Plains etc. NES 1426 etc.

E. campanulata *R. T. Baker.* Common on the granite ranges along the eastern edge of the area, and otherwise bordering the area on the eastern side; see note under *E. andrewsii.* NES 3365 etc.

E. codonocarpa *Blakely and McKie.* Type from Pheasant Mountain, 2 miles NE of Backwater; growing in small patches on the northern aspect of this granite hill. This species is very closely allied to *E. approximans* Maiden, and may only be a form of it. (See Anderson 1957.) *E. approximans* is recorded from just to the east of the area, on Barren Mtn., which is SW of Deer Vale. NES 3416. (Blakely and McKie 1930.)

E. conica *Deane and Maiden.* From the Hillgrove turnoff on the Armidale-Wollomombi road, to Wollomombi, and south-east to Jeogla; Wollomombi Station; Winterbourne and Enmore area; Toryburn; Abington; Bolivia; Tingha; and 7 miles W of Tenterfield. NES 3363 etc.

E. crawfordii Maiden and Blakely. See *E. acaciiformis.*

E. crebra *F. Muell.* (*E. racemosa* auct. austr. non Cav.). Common in the north and north-western portion of the area, on rugged granite and porphyry country, and often in association with *E. dealbata*. The main distribution in the New England, is in the country bounded by the following locations: Texas Road Well, Bukkulla, Nullamann, Swan Vale, Wellingrove, Ranger's Valley, Emmaville and Rocky Creek (NW of Strathbogie). NES 3327 etc.

E. cyathiformis Blakely and McKie, see *E. caliginosa.*

E. dealbata *A. Cunn. ex Schauer.* Common on hilly granite, porphyry and quartzite country in the western half of the area. Generally found growing on skeletal or very shallow soil near the tops of hills in association with one of the following species: *E. youmanii*, *E. crebra*, *E. bancroftii*, *E. caleyi*, *E. sideroxylon* and *E. melanophloia*. NES 3378 etc.

E. deanei *Maiden.* Fairly common on the Great Divide from E of Glen Innes to Boonoo Boonoo and Wilson's Downfall; common on the rugged granite country at Torrington, and north and north-east thereof. NES 54 etc.

E. dives *Schauer.* Fairly common on skeletal ridges in the Branga, Glen Morrison and Ingalba areas and on the ranges N of Camp Fire (10 miles N of Niangala). NES 3362.

E. elaeophora F. Muell. See *E. goniocalyx.*

E. fastigata *Deane and Maiden.* Ebor and Point Lookout areas, and 6 miles E of Yarrowitch; not common. NES 1427; NEU; NSW.

E. goniocalyx *F. Muell. ex Miq.* A small remnant of this species occurs near the top of a hill 7 miles NW of Yarrowyck. *E. goniocalyx* F. Muell. ex. Miq. var. *parviflora* Blakely and McKie, is recorded from the side of the gorge at Wollomombi Falls. A variable complex of trees, generally intermediate between *E. goniocalyx* and *E. elaeophora* occurs in the south-eastern portion of the area, from Kookabookra through Ward's Mistake, Wongwibinda, Wollomombi and Hillgrove and from Enmore to Winterbourne. NES 2139.

E. hemiphloia *F. Muell.* Common in the western half of the area e.g., from Rocky Creek to Strathbogie and Fladbury, from Ashford to Texas Road Well, and Bukkulla and north-east thereof; from Tiengha Creek (N of Bundarra), through Bundarra, E of Abington and Toryburn and S of Kingstown. In the south-eastern portion of the area it is fairly common in the area from N of Thalgarah to Metz, and from Wollomombi to Jeogla, and less common in the Enmore and Winterbourne areas.

E. "huberiana" complex. Widespread and common throughout the area. This variable complex is apparently the result of extensive hybridisation between *E. viminalis* and various other members of the section Macrantherae; in the New England Region it is likely that *E. nova-anglica* is the most common second parent which has contributed to the *E. huberiana* complex. See Pryor 1955 for further discussion.

E. laevopinea *R. T. Baker.* Common on the high range country from Guyra to Niangala and Bendemeer. Also common elsewhere in the south-eastern portion of the area in hilly range country, e.g., from 10 miles NE of Wollomombi to Puddledock, and from the Winterbourne area to Walcha Road, and east to Walcha. In the western half of the area the species apparently forms hybrid swarms with *E. macrorhyncha* where the range of these two species overlap, however populations of comparatively pure *E. laevopinea* are to be found, e.g., in the following areas: 4 miles N of Tent Hill, NE of Emmaville; Moredun; Wandsworth and Ollera areas; 8 miles W of Black Mountain; to the W and NW of Yarrowyck, and 5 miles W of Watson's Creek. *E. laevopinea* var. *minor* Maiden, is recorded from Walcha and Glen Innes by Blakely. Owing to the wide range of variation in the fruit of *E. laevopinea* and its hybrids, it is doubtful whether there is any point in keeping the variety *turbinata* of Blakely and McKie separate. NES 3369 etc.

E. laseronii R. T. Baker and varieties. See *E. stellulata.*

E. macrorhyncha *F. Muell.* Very common on hills and in hilly country in the western half of the area. For notes on hybrid swarms see *E. laevopinea.* NES 3321 etc.

E. malacoxylon *Blakely.* For discussion of hybrid swarm see *E. bridgesiana.* The species is fairly common south of the area, from the Moonbi Range to above Nundle, however in the area between the Nandewar and Moonbi Ranges it is generally found as weak isolated trees or small populations on granite hills, and is strongly attacked by borers. NES 1463.

E. mannifera *A. Cunn. ex Mudie*, sens. lat. According to Mr. L. A. S. Johnson of the National Herbarium NSW., *E. mannifera* as recognised by W. F. Blakely consists of two distinct entities in the New England, viz. a form of *E. maculosa* and a form of *E. dalrympleana*. Until this matter is further elucidated, the name is used here in the sense of W. F. Blakely's " Key to the Eucalypts." Widespread and common throughout the area in a wide variety of habitats. NES 3300 etc.

E. mckieana *Blakely*. Type from Moredun Creek; Bundarra to Beverley, NW of Bundarra; Limestone and Moredun Creek areas, W of Wandsworth; Retreat area; on soils derived from granite and porphyry. See *E. tinghaensis*. NES 3322 etc.

E. melanophloia *F. Muell.* Common in the extreme north-western portion of the area on soils derived from quartzite rocks e.g., Mingoola Dam site (Severn River, 40 miles W of Tenterfield), and from Texas Road Well, northwards through Ashford towards Bonshaw. Blakely also records the species from Howell. This species is believed to hybridise with *E. melliodora*, giving rise to *E.* × *auburnensis* Maiden. This hybrid is recorded by Blakely from Auburn Vale, near Inverell, and is also to be found as a small clump of trees on the road NE of Bundarra along the southern side of Moredun Creek, see NES 1977. NES 47 etc.

E. melliodora *A. Cunn. ex Schau.* Widespread and common throughout the area, generally found in association with *E. blakelyi*. NES 3339 etc.

E. michaeliana *Blakely*. Type from Hillgrove; 4 miles SE of Hillgrove, on Long Point Road; 5 miles NE of Winterbourne; Enmore and Jeogla areas. Generally occurs in small, rather dense stands, not common. NES 1454 etc.

E. nicholii *Maiden and Blakely*. (*E. Nicholi* Maiden and Blakely). Glen Innes; Limestone and Moredun Creeks; Parlour Mountains area, W of Booroolong; between Rockvale and Aberfoyle; on Armidale-Wollomombi road 8 miles E of Armidale and 6 miles W of Wollomombi; from Metz and Hillgrove southwards to Mihi Falls; Enmore and Winterbourne area; a few miles SW of Wollun; SE of Surveyor's Creek and N of Camp Fire; from Apsley Falls to Tia. NES 3356.

E. nitens *Maiden*. Point Lookout. NES 1559.

E. nova-anglica *Deane and Maiden*. Widespread and very common, mainly in the eastern half of the area, but extending into the western half. Generally confined to valleys, but covers low undulating hills in granite country. See note under *E.* " *huberiana*." NES 1523 etc.

E. obliqua *L'Hérit.* Near Tenterfield; Mt. Bajimba to Little Mt. Spirabo; in the granite area E of Mt. Mitchell; Backwater and Oban to Kookabookra and Yarrow Creek; Yellow Gap, SW of Oban; 5 miles W of Oban; Ebor and Guy Fawkes areas; Doughboy Ranges, Ebor area; Point Lookout; top of Mt. Duval; from NE and E of Enmore southwards to Moona Plains; and SE of Yarrowitch. Generally found on the tops of granite and basalt hills, and more rarely on sedimentary rocks near the eastern scarp edge. NES 3354.

E. pauciflora *Sieb. ex Spreng.* (*E. coriacea* A. Cunn. ex Schauer.) Very common, mainly in the eastern half of the area, but extending somewhat into the western half. This species is known to hybridise freely with both *E. radiata* and *E. dives*, and considerable gene exchange can be expected to occur wherever these species and *E. pauciflora* are growing in close proximity; (see Pryor 1950). Trees formerly referred to *E. vitrea* R. T. Baker on the New England Tablelands are mainly due to hybridisation between *E. pauciflora* and *E. radiata*, and the following varieties of *E. pauciflora* described by Blakely and McKie most likely have the same hybrid origin: *E. pauciflora* var. *densiflora* Blakely and McKie; *E. pauciflora* var. *rusticata* Blakely and McKie; *E. pauciflora* var. *cylindrocarpa* Blakely and McKie. *E. callanii* Blakely is most likely a hybrid between *E. pauciflora* and forms of *E. caliginosa*; it is occasionally met with in the New England, e.g., Spring Mount, Guyra area; Oorundunby Station area; etc., NES 1540.

E. peacockeana Maiden. See *E. sideroxylon.*

E. quadrangulata *Deane and Maiden.* Enfield State Forest, near Yarrowitch on the Walcha-Port Macquarie road, 4,000 feet. NSW.

E. radiata *Sieb. ex DC.* Very common in hilly granite country in the eastern half of the area, and generally found growing in association with *E. acaciiformis.* This species hybridises freely with *E. pauciflora.* NES 3270.

E. saligna *Sm.* Very common in the area adjoining the New England Tablelands on the eastern side and occasionally found on the eastern scarp edge, e.g., Moona Plains; 5 miles SE of Hillgrove on Long Point Road; Jeogla etc. NES 3293 etc.

E. scoparia *Maiden.* Wallangarra; Timbarra area, E of Tenterfield; not common. NES 16 etc.

E. seeana *Maiden.* Wilson's Downfall area. NES 3776.

E. sideroxylon *A. Cunn. ex Woolls.* Common in the hilly granite country between Inverell, Gilgai, Kimberly, Tingha, S of Newstead and NE of Stannifer. Also fairly common in the area from Abington to Kingstown, N of Retreat and E and NE of Toryburn. This species can be expected to hybridise with both *E. albens* and *E. hemiphloia*, and *E. affinis* Deane and Maiden is most likely a hybrid between *E. sideroxylon* and *E. albens.* E. × *peacockeana* Maiden and E. × *stopfordii* Maiden, both from the Inverell district are of hybrid origin, with *E. sideroxylon* as one parent. NES 1950 etc.

E. stellulata *Sieb. ex DC.* Common, mainly in the eastern half of the area, but also extending somewhat into the western half. The following taxa are believed to be of hybrid origin, with *E. stellulata* and various forms of *E. caliginosa* as the parents: *E. laseronii* R. T. Baker, *E. laseronii* var. *doleiformis* Blakely and McKie, *E. laseronii* var. *maxima* Blakely and McKie.

E. × stopfordii Maiden. See *E. sideroxylon.*

E. tinghaensis *Blakely and McKie.* Type from G. W. Browning's property, 6 miles from Tingha. Common in the Tingha and Gilgai areas; Cope's Creek; Limestone and Moredun Creek area. According to Mr. L. A. S. Johnson, this species hybridises freely with *E. mckieana* near Gilgai, and a possible hybrid swarm was observed by the author 5 miles E of Howell. NES 3317 etc.

E. viminalis *Labill.* See *E. huberiana.* For the purposes of the New England Survey this species was included in the *E. huberiana* complex; however Mr. L. A. S. Johnson considers that populations of pure *E. viminalis* do occur in the New England.

E. vitrea R. T. Baker. See *E. radiata.*

E. youmanii *Blakely and McKie.* (*E. Youmani* Blakely and McKie). Type from Rosehill, 6½ miles SW of Guyra. Common in hilly country throughout the western half of the area, and very variable, especially in the south-western portion of the area. This is probably due to extensive hybridisation with other stringybarks in the area. A very umbrageous and large-fruited form of this species is to be found in the south-eastern portion of the area in the following localities; 4 miles NW of Guy Fawkes on the Wongwibinda road; Enmore area; NE of Winterbourne; 2 miles NW of Walcha Road; approximately 8 miles SE of Surveyor's Creek on the road to Ingalba. Blakely records *E. youmanii* var. *sphaerocarpa* Blakely and McKie from 6 miles SW of Guyra; however, because of the great variability of the species generally there seems to be little point in separating a single variety. NES 1459 etc.

Eucalyptus sp. aff. **E. oblonga** *DC.*. A few trees, 4 miles from Hillgrove on the Long Point road. NES 1421.

Homoranthus *A. Cunn. ex Schau.* (See Cheel 1923.)

H. flavescens *A. Cunn. ex Schau.* Bora Creek, Inverell area ; Inverell area; Howell. NSW.

Kunzea *Reichb.*

K. ambigua (*Sm.*) *Druce.* (*K. corifolia* (Vent.) Reichb.). Kentucky area. NSW.

K. bracteolata *Maiden and Betche.* Wallangarra. (Maiden and Betche 1905.)

K. opposita *F. Muell.* Gilgai; Stannifer; Howell; Timbarra. NES 1683; 2358. (Maiden and Betche 1905.)

K. parvifolia *Schau.* SE of Ashford; Torrington area. NES 2036 etc.

Kunzea sp. Gilgai. NES 2354.

Leptospermum *J. R. et G. Forst.*

L. arachnoides *Gaertn.* (*L. arachnoideum* Sm.). Wilson's Downfall; Boonoo Boonoo; Torrington; Howell; Tingha; Gibraltar Range; Pheasant Creek, Glen Elgin area; Parlour Mountains, Booroolong area; a shrub of hilly acid porphyry and granite country. NES 1476; NSW. (Maiden 1906; Cambage 1908.)

L. attenuatum *Sm.* (*L. stellatum* Cav.). Ben Lomond area; Torrington. NES 3200; NSW.

L. brachyandrum (*F. Muell.*) *Druce.* (*L. abnorme* F. Muell.). Wilson's Downfall; Amosfield to Maryland. NES 3763; NSW.

L. brevipes *F. Muell.* Torrington; Howell; Tingha to Tenterden; Pindari to Ashford; 4 miles S of Inverell; Gibraltar Range; Ben Lomond; Guy Fawkes. NES 1986 etc.; NSW.

L. flavescens *Sm.* and forms. Very variable, widespread and common, on the banks of creeks throughout the area. NES 13 etc.

L. minutifolium *C. T. White.* Wilson's Downfall; Torrington; Tungsten; Tenterden; Wandsworth; vicinity of Little Mt. Spirabo; Guyra to Tingha; Backwater; Parlour Mountains; Point Lookout area; Moredun Dam; Chandler's Peak. NES 2966 etc.; NSW.

L. myrtifolium *Sieb. ex DC.* Doughboy Range; Ebor Falls; Tia. NES 1475 etc.

L. parvifolium *Sm.* Torrington; Emmaville. NSW.

One or more *Leptospermum* species from the following areas have not yet been satisfactorily determined: Point Lookout; Pheasant Mountain; 3 miles W of Wandsworth; Doughboy Range, Ebor area; 1 mile N of Howell. These generally occur on granite hills.

Melaleuca *L.*

M. alternifolia *Cheel.* Wallangarra; Jennings. NES 3738. (Cheel 1924.)

M. bracteata *F. Muell.* Walcha. NSW.

M. erubescens *Otto.* Pindari to Ashford. NES 2070.

M. groveana *Cheel and White.* Torrington. NSW.

M. nodosa *Sm.* Torrington. NSW.

Micromyrtus *Benth.*

M. ciliata (*Sm.*) *Druce.* (*M. microphylla* (Sieb.) Benth.). Torrington area. NES 78.

Tristania *R. Br.*

T. conferta *R. Br.* Common in the area adjoining the New England Tablelands on the eastern side, and occasionally found on the eastern edge of the tablelands proper.

ONAGRACEAE

Epilobium *L.*

E. glabellum *Forst. f.* Fairly widespread but of somewhat sparse occurrence. A large white flowered form (NES 2616) was found on a stream in the Yarrow Creek area. NES 2617 etc.

E. junceum *Forst. f. ex Spreng.* Widespread and common. NES 1639.

Oenothera *L.*

*__O. erythrosepala__ *Borbás.* (*O. lamarkiana* De Vries, non Ser. ex DC.). Inverell; Glen Innes; Guyra area; generally on roadsides, or in fields near roads. NES 3439 etc.; NSW.

*__O. stricta__ *Ledeb.* ex Link. (*O. odorata* auct.). Fairly common on roadsides N and S of Tenterfield. NES 3168 etc.,

*__O. tetraptera__ *Cav.* Wallangarra; Glen Innes area. NSW; BRI.

HALORAGIACEAE

Haloragis *Forst. et f.*

H. heterophylla *Brongn.* sens. lat. Widespread and very common. NES 2583.

H. micrantha (*Thunb.*) *R.Br.* Inverell; Gilgai, S of Inverell; Oban area; Yarrow Creek area; swampy areas in hilly granite country. Turner records the species from Salisbury Plains. NES 2350; NSW.

H. tetragyna (*Labill.*) *Hook. f.* Variable; fairly widespread, of somewhat sparse occurrence. NES 2451.

Myriophyllum *L.*

M. pedunculatum *Hook. f.* Torrington area, rare. NES 3472.

M. propinquum *A. Cunn.* (*M. variifolium* Hook. f.). Fairly common in streams, dams and lagoons throughout the area. NES 2303.

M. verrucosum *Lindl.* Somewhat variable; in streams throughout the area. NEU.

ARALIACEAE

Astrotricha *DC.*

A. longifolia *Benth.* sens. lat. 4 miles N of Torrington; top of Wollomombi gorge; Turner records the species from Steinbrook. NES 38; NEU.

Tieghemopanax *R. Viguier*

T. sambucifolius (*Sieb. ex DC.*) *R. Viguier*, and forms. (*Panax sambucifolius* Sieb. ex DC.). Yarrow Creek; Glen Elgin to Dundee; Moona Plains; of somewhat sparse occurrence and generally found in granite hill country in the eastern half of the area. NES 2568.

UMBELLIFERAE

Actinotus *Labill.*

A. gibbonsii *F. Muell.* Boonoo Boonoo. NSW.

A. helianthi *Labill.* Wallangarra; Torrington; Howell. NES 26. (Maiden and Betche 1901; Maiden 1906; Cambage 1908.)

Apium *L.*

***A. tenuifolium** (*Moench*) *Thell.* (*A. ammi* auct. austr.; *A. leptophyllum* (DC.) F. Muell.). Widespread and fairly common. NES 2212 etc.

Conium *L.*

***C. maculatum** *L.* Fairly common in towns and waste places near roadsides etc., e.g., 2 miles N of Guyra, on Railway line enclosure, etc. NES 3856; NEU.

Daucus *L.*

***D. glochidiatus** (*Labill.*) *Fisch., Mey. et Avé-Lall.* Fairly widespread and fairly common. NES 2101 etc.

Eryngium *L.*

E. rostratum *Cav.* Chiswick, 10 miles S of Armidale. NES 3888; JB.

E. vesiculosum *Labill.* Glen Innes; Tenterden; Stonehenge; Ebor Falls; Walcha; Turner records the species from Wellingrove. NSW; NEU.

Foeniculum *Mill.*

***F. vulgare** *Mill.* (*Anethum foeniculum* Willd.). Armidale. NES 3144.

Hydrocotyle *L.*

H. laxiflora *DC.* Widespread and common. NES 2481 etc.

H. peduncularis *R.Br. ex A. Rich.* Fairly widespread and fairly common. NES 2335 etc.; NSW.

Lilaeopsis *Greene* (See Hill 1927.)

L. australica (*F. Muell.*) *A. W. Hill.* 1½ miles N of Guyra; Walcha. NEU; BRI.

Oreomyrrhis *Endl.* (See Mathias and Constance 1955.)

O. eriopoda (*DC.*) *Hook. f.* Serpentine River; Ebor Falls; Chiswick, 10 miles S of Armidale; Walcha Road; Moona River, Walcha area. NEU.

Pastinaca *L.*

***P. sativa** *L.* (*Peucedanum sativum* (L.) Benth.) Vicinity Glen Innes, roadsides; 1 mile N of Guyra, roadside and railway line enclosure. NES 3871 etc.

Platysace *Bunge*

P. ericoides (*Sieb. ex DC.*) *C. Norman.* (*Trachymene ericoides* Sieb. ex DC.) Fairly common on hilly granite areas in the eastern half of the area; also Tingha and Torrington areas. NES 2563 etc.

P. lanceolata (*Labill.*) *Druce.* Pheasant Mt., vicinity Backwater; Doughboy Range. NES 2920 etc.

Seseli *Rivin.*

S. harveyanum *F. Muell.* Ebor Falls. NEU.

Trachymene *Rudge*

T. incisa *Rudge.* (*Didiscus incisus* (Rudge) Hook. f.) Variable, fairly widespread but of sparse occurrence. NES 2142 etc.

Trachymene sp. (*T. pilosa* auct. austr.; *Didiscus pilosus* Benth.) Wollomombi area. NES 1839 etc.

ERICACEAE

Gaultheria *L.* (See Burtt and Hill 1935.)

G. appressa *A. W. Hill* var. **glabra** *A. W. Hill.* Point Lookout, rare. NEU.

EPACRIDACEAE

Acrotriche *R.Br.* (See Paterson 1960.)

A. aggregata *R.Br.* 7 miles NE of Tenterfield, hilly granite country in *Eucalyptus campanulata* association; Wilson's Downfall; Turner records the species from Red Range. NES 2467; CANB.

Brachyloma *Sond.*

B. daphnoides *Benth.* Widespread and common. NES 4.

B. daphnoides *Benth.* var. **latiusculum** *Blakely and McKie.* Torrington; Pheasant Mountain, Backwater area. NES 4. (Blakely and McKie 1930.)

Epacris *Cav.*

E. microphylla *R.Br.* Doughboy Range etc.; swampy areas in montane granite country on the eastern margin of the area. NES 1972 etc.

E. petrophila *Hook. f.* (*E. breviflora* Stapf). Similar range and habitat to *E. microphylla* R.Br. NES 2889.

Leucopogon *R.Br.*

L. attenuatus *A. Cunn.* 3 miles W of Wandsworth; Bundarra area; Baldersleigh to Abington; Parlour Mountains, Booroolong area; Tea Tree Creek, Armidale-Bundarra road; hilly porphyry country in the western half of the area. NES 2028 etc.

L. biflorus *R.Br.* Parlour Mountains, Booroolong area. NES 1808; NEU.

L. fraseri *A. Cunn.* Fairly widespread and fairly common in native pastures in the area. NES 2425 etc.

L. hookeri *Sond.* Tia Falls; Wollomombi; Pt. Lookout area. NSW; NEU.

L. lanceolatus (*Sm.*) *R.Br.* Fairly common on granite and porphyry hills throughout the area. NES 2507 etc.

L. melaleucoides *A. Cunn.* Wallangarra; Howell; Torrington area; Baldersleigh area; Tea Tree Creek, Armidale-Yarrowyck road; on hills in rugged granite and porphyry country, mainly in the western half of the area. NES 2011 etc.

L. microphyllus *R.Br.* (includes var. *pilibundus* (A. Cunn. ex DC.) Benth.). Wallangarra; Gibraltar Range, 40 miles NE of Glen Innes; Torrington; Bismuth; Backwater. NES 3230; NSW.

L. muticus *R.Br.* Gilgai, S of Inverell; Yarrowyck area; Longford area; near the tops of granite and porphyry hills in the western half of the area. NES 2362 etc.

L. neo-anglicus *F. Muell.* Longford, skeletal porphyry hill; 3 miles W of Wandsworth, porphyry hill. NES 2024 etc.

L. virgatus *R.Br.* Longford; Balala to Retreat; Parlour Mountains; fairly common in hilly granite and porphyry country in the western half of the area. NES 2845 etc.

Lissanthe *R.Br.*

L. strigosa (*Sm.*) *R. Br.* Widespread and very common. NES 2027 etc.

Melichrus *R.Br.* (See Paterson 1957.)

M. procumbens (*Cav.*) *Druce.* (*M. rotatus* R.Br.) Doughboy Range, Ebor area; Tenterfield; Bismuth; Glen Innes; Backwater; Wollomombi, E of dog gate; Glen Elgin. NES 2902; NSW; CANB.

M. urceolatus *R.Br.* Widespread and common, for localities see Paterson 1957. NES 1526 etc.; NSW.

Monotoca *R.Br.*

M. scoparia (*Sm.*) *R.Br.* Fairly widespread and fairly common. NES 2489 etc.

Styphelia *Sm.*

S. triflora *Andr.* Wellingrove and Torrington areas. NES 2745 etc.

Trochocarpa *R.Br.*

T. laurina *R.Br.* 7 miles NE of Tenterfield in *Eucalyptus campanulata* association; not common. Turner records the species from " near Mt. Mitchell ". NES 2462.

MYRSINACEAE

Rapanea *Aubl.*

R. variabilis (*R.Br.*) *Mez.* (*Myrsine variabilis* R. Br.). Wallangarra. NSW.

PRIMULACEAE

Anagallis *L.*

***A. arvensis** *L.* Fairly widespread and fairly common. NES 1626 etc.

OLEACEAE

Jasminum *L.*

J. suavissimum *Lindl.* Emmaville; Inverell area; Turner records this species from Steinbrook. NES 86 etc.

Notelaea *Vent.*

N. linearis *Benth.* Wallangarra. NES 2554.

N. microcarpa *R.Br.* Fairly widespread but of very sparse occurrence. NES 23 etc.

LOGANIACEAE

Logania *R. Br.*

L. floribunda (*Andr.*) *R.Br.* Torrington; Howell; Ebor Falls; Tia Falls; Guyra. NSW.

Mitrasacme *Labill.*

M. indica *Wight.* Tenterfield; Glen Elgin. NSW; CANB.

M. paludosa *R.Br.* Wallangarra; Chandler's Peak. NSW.

GENTIANACEAE

Centaurium *Hill*

C. minus Moench.* (*Erythraea centaurium* (L.) Pers., *Centaurium umbellatum* Gilib.) Widespread and fairly common. NES 2865.

MENYANTHACEAE

Nymphoides *Hill*

N. geminata (*R.Br.*) *Kuntze.* (*Limnanthemum geminatum* (R.Br.) Griseb.). Fairly widespread in swamps and lagoons, e.g., Little Lagoon, 5 miles S of Guyra; Boonoo Boonoo; Saumarez Pond; Tia to Walcha. NES 3209; NEU; NSW.

ASCLEPIADACEAE

Asclepias *L.*

***A. fruticosa** *L.* (*Gomphocarpus fruticosus* (L.) R.Br.). Booroolong Creek NEU.

CONVOLVULACEAE

Convolvulus *L.*

C. erubescens *Sims.* Widespread and common. NES 1735 etc.

Cuscuta *L.* (See Yuncker 1932.)

***C. epithymum** (*L.*) *Murray.* Glen Innes area. NSW.

Dichondra *Forst. et f.*

D. repens *Forst. et f.* A variable species, widespread and common. NES 2194 etc.

Evolvulus *L.*

E. alsinoides *L.* Mingoola Dam site, Severn River, 40 miles W of Tenterfield, *Eucalyptus melanophloia* association on quartzite hill. NES 2689.

BORAGINACEAE

Cynoglossum *L.*

C. australe *R.Br.* var. **drummondii** (*Benth.*) *Brand.* (*C. drummondii* Benth.). 9 miles S of Ashford, *Eucalyptus crebra* association on quartzite hill; Yarrowyck area; Uralla to Rocky Gully; fairly widespread, most commonly found on soils derived from granite. NES 1620 etc.

C. latifolium *R.Br.* Walcha district. NSW.

Echium *L.*

***E. plantagineum** *L.* (*E. violaceum* auct. austr.). Inverell area; Armidale township; roadsides and waste places. NES 3031 etc.

Heliotropium *L.*

***H. amplexicaule** *Vahl.* Jennings area, common on roadsides. NES 3728.

Lithospermum *L.*

***L. arvense** *L.* Guyra. NSW.

Myosotis *L.*

M. australis *R.Br.* Ben Lomond area; Yarrowyck area; not common. NES 2198 etc.

VERBENACEAE

Verbena *L.*

***V. bonariensis** *L.* Widespread and common, generally on roadsides, waste places, areas adjoining railway lines etc. NES 2205 etc.

V. officinalis *L.* Inverell area. NES 2387 etc.

***V. rigida** *Spreng.* (*V. venosa* Gill. et Hook.). Fairly common on roadsides in the Guyra area. NES 3183.

LABIATAE

Ajuga *L.*

A. australis *R.Br.* Widespread and common. NES 1746.

Lycopus *L.*

L. australis *R.Br.* Glen Innes. NSW.

Marrubium *L.*

***M. vulgare** *L.* Widespread and common, on roadsides and waste places. NES 1607.

Mentha *L.*

M. satureioides *R.Br.* Fairly widespread, fairly common in the Armidale and Guyra areas on roadsides near cultivation. NES 2569.

Moluccella *L.*

***M. laevis** *L.* Bukkulla, N of Inverell; Armidale. NSW.

Plectranthus *L'Hér.*

P. graveolens *R.Br.* Torrington. NSW.

Prostanthera *Labill.*

P. euphrasioides *Benth.* Howell; Wallangarra. NSW.

P. granitica *Maiden and Betche.* Howell. NSW.

P. nivea *A. Cunn.* Howell; Emmaville; Wellingrove; Yarrowyck; Shannon's Vale; on granite and porphyry hills. NES 2136 etc.

P. saxicola *R.Br.* var. **major** *Benth.* Jennings; Pheasant Creek, Glen Elgin area. NSW.

P. staurophylla *F. Muell.* Tenterfield area. (Moore and Betche 1893.)

P. teretifolia *Maiden and Betche.* Type from Torrington; Bismuth and Tungsten. (Maiden and Betche 1908.)

Prostanthera sp. aff. **scutellarioides** (*R.Br.*) *Druce.* Guy Fawkes; Doughboy Ranges. NES 3115.

Prunella *L.*

P. vulgaris *L.* Parlour Mountains, Booroolong area; Llangothlin. NES 3852 etc.

Salvia *L.*

S. plebeia *R.Br.* Moredun Dam; Glen Innes. NSW.

*__S. verbenaca__ *L.* sens. lat. Widespread and common, on roadsides and waste places. NES 2827; NEU.

Scutellaria *L.*

S. humilis *R.Br.* Yarrowyck area. NES 2106.

Teucrium *L.*

T. corymbosum *R.Br.* Wollomombi Falls. NES 2516.

Westringia *Sm.* (See Boivin 1948.)

Westringia sp. Jennings; Tungsten; Guy Fawkes to Wollomombi. NSW.

SOLANACEAE

Anthocercis *Labill.*

A. albicans *A. Cunn. in Field.* Boonoo Boonoo. (Maiden and Betche 1905.)

Datura *L.*

*__D. stramonium__ *L.* form. (*D. tatula* L.). Deepwater, on roadside; Gara River. NES 3074.

Nicotiana *L.*

(See Wheeler 1935; Goodspeed 1954; Burbidge 1960.)

N. debneyi *Domin.* Moona, Walcha. (Goodspeed 1954.)

Physalis *L.*

*__P. angulata__ *L.* Llangothlin; Inverell. NSW.

Solanum *L.*

S. amblymerum *Dun.* Mingoola Dam site, 40 miles W of Tenterfield; Tent Hill; Longford. NES 2744 etc.

S. armatum *R.Br.* Castle Doyle. NES 196.

S. aviculare *Forst.* Balala area, on granite hill; Gibraltar Range. NES 2340. (Baylis 1954.)

S. campanulatum *R.Br.* Wallangarra; Torrington. NSW.

S. cinereum *R.Br.* Yarrowyck; Longford. NES 2163 etc.

S. ellipticum *R.Br.* Mingoola Dam site, 40 miles W of Tenterfield; Ashford area. NES 2519 etc.

S. nigrum *L.* Fairly widespread but of sparse occurrence. NES 2773 etc.

*__S. triflorum__ *Nutt.* 20 miles S of Tenterfield, waste place near New England Highway. NES 3712.

S. violaceum *R.Br.* Fairly widespread but of sparse occurrence, somewhat variable. NES 3056 etc.

SCROPHULARIACEAE

Celsia *L.*

*__C. cretica__ *L. f.* 2 miles N of Tenterfield, on railway line enclosure; not common. NES 3723.

Euphrasia *L.* (See Du Rietz 1948.)

E. scabra *R.Br.* Boonoo Boonoo; Stannum; Torrington; Chandler's Peak. NSW.

Glossostigma *Wight and Arn.*

G. diandrum (*L.*) *O. Ktze.* (*G. spathulatum* Wight and Arn.). Apsley River, Walcha area. NSW. (Maiden and Betche 1899.)

G. elatinoides (*Benth.*) *Benth. ex Hook. f.* Apsley River, Walcha area. NSW. (Maiden and Betche 1899.)

Gratiola *L.*

G. pedunculata *R.Br.* Amosfield to Maryland; Glen Innes to Deepwater. NES 3762.

G. peruviana *L.* Yarrow Creek area; Wollomombi; Pt. Lookout area; Blue Hole, 9 miles SE of Armidale; Parlour Mountains, Booroolong area. NES 2987; NEU.

Limosella *L.*

L. australis *R.Br.* (*L. aquatica* auct., non L.). Jennings area; 5 miles SW of Guyra; Apsley River, Walcha area. NES 3729; NSW. (Maiden and Betche 1899.)

Mimulus *L.* (See Grant 1924.)

M. gracilis *R.Br.* Aberfoyle area; Chiswick, 10 miles S of Armidale. NES 2882; CANB.

***M. moschatus** *Dougl.* Ebor district. NEU.

Verbascum *L.*

***V. thapsus** *L.* Widespread and common, on roadsides etc. NES 3713; BRI.

***V. virgatum** *Stokes.* Widespread and common, on roadsides etc. NES 2390 etc.; NSW.

Veronica *L.*

***V. arvensis** *L.* Yarrowyck; Chiswick, 10 miles S of Armidale; Severn River, near Ashford. NES 1768 etc.

V. calycina *R.Br.* sens. lat. Fairly widespread, variable. NES 3203 etc.

V. perfoliata *R.Br.* Doughboy Range; Serpentine River; Pheasant Mt., Backwater area. NES 2890; NSW.

LENTIBULARIACEAE

Utricularia *L.*

U. dichotoma *Labill.* Fairly widespread but of somewhat sparse occurrence, grows in moist situations and swampy areas. NES 2186 etc.

U. flexuosa *Vahl.* Saumarez Pond; on a sheet of *Nymphoides geminatum*, and is apparently found growing amongst the stems of this species. NEU.

ACANTHACEAE

Dipteracanthus *Nees*

D. australis (*R.Br.*) *Hassk.* (*Ruellia australis* R.Br.). Mingoola Dam site, Severn River, 40 miles W of Tenterfield; on quartzite hills; rare. NES 2526.

Rostellularia *Reichb.*

R. procumbens (*L.*) *Nees.* (*Justicia procumbens* L.) Mingoola Dam site, Severn River, 40 miles W of Tenterfield; 3 miles E of Inverell, *Eucalyptus albens* association on soil derived from basalt; Abington area. Of somewhat sparse occurrence, most commonly found in hilly quartzite country in the western half of the area. NES 2690 etc.

MYOPORACEAE

Myoporum *Soland. ex Forst. f.*

M. montanum *R.Br.* Inverell area; Yarrowyck area; Dangarsleigh Falls. NES 1951 etc.

PLANTAGINACEAE

Plantago *L.*

***P. coronopus** *L.* On roadside near Jennings; not common. NES 3731.

***P. lanceolata** *L.* Widespread and very common, especially in towns, on roadsides, waste places etc., NES 1835 etc.

P. varia *R.Br.* Widespread and common. NES 1749 etc.

RUBIACEAE

Asperula *L.* (See Shaw and Turrill 1928.)

A. ambleia *Shaw and Turrill.* Gara River, 9 miles E of Armidale. NSW.

A. charophyton *Shaw and Turrill.* Near Tenterfield. (Shaw and Turrill 1928.)

A. conferta *Hook. f.* Widespread and common. NES 1785 etc.

A. subulifolia *Shaw and Turrill.* Near Tenterfield. (Shaw and Turrill 1928.)

Canthium *Lam.*

C. odoratum (*Forst. f.*) *Seeman.* (*C. lucidum* Hook. and Arnott). Mingoola Dam site, Severn River, 40 miles W of Tenterfield. NES 2532.

Coprosma *J. R. et G. Forst.* (See Oliver 1935.)

C. hirtella *Labill.* Yarrowitch. BRI. (Oliver 1935.)

Galium *L.*

G. binifolium *N. A. Wakefield.* Emmaville. NSW.

G. gaudichaudii *DC.* Fairly widespread, but of somewhat sparse occurrence. NES 2102 etc.

G. propinquum *A. Cunn.* Glen Innes; Yarrowyck; Balala; Ebor Falls. NES 2190 etc. NSW; NEU.

Opercularia *Gaertn.*

O. aspera *Gaertn.* Yarrowyck. NES 2173.

O. hispida *Spreng.* NW of Wellingrove, porphyry hill, *Eucalyptus andrewsii* association; Balala, granite hill, *E. macrorhyncha* association. NES 2338 etc.

Pomax *Sol.*

P. umbellata *Sol.* Common on hills throughout the area. NES 2502 etc.

CUCURBITACEAE

Sicyos *L.*

S. angulatus *L.* Blackgang, Ebor area. NEU.

CAMPANULACEAE

Isotoma *R. Br.* (See Wimmer 1953.)

I. anethifolia *Summerhayes.* (*Laurentia anethifolia* (Summerhayes) E. Wimm.). Tenterfield; Gilgai, S of Inverell, *Euc. macrorhyncha* association on granite hill. NES 2360.

I. axillaris *Lindl.* (*Laurentia axillaris* (Lindl.) E. Wimm.). Mt. Mitchell; Chandler's Peak; Yarrowyck area; generally found on the south-western aspect of granite and porphyry hills. NES 2147; NEU.

I. fluviatilis (*R.Br.*) *F. Muell.* (*Lobelia fluviatilis* R.Br.; *Laurentia fluviatilis* (R.Br.) E. Wimm.). Yarrowyck area, damp situation in granite valleys, rare. NES 2195.

Lobelia *L.* (See Wimmer 1953.)

L. dentata *Cav.* Silent Grove, north of Torrington, *Euc. andrewsii* association on granite hill; Baldersleigh area, *Euc. andrewsii* association on porphyry hill; fairly rare. NES 2883 etc.

L. gibbosa *Labill.* Ebor; Wollomombi area at dog gate; not common. NSW; NEU.

L. trigonocaulis *F. Muell.* Gibraltar Range NE of Glen Innes, on the margins of Rain Forest areas. NES 3117.

Pratia *Gaudich.* (See Wimmer 1953.)

P. purpurascens (*R.Br.*) *E. Wimm.* (*Lobelia purpurascens* R.Br.). Fairly common in damp situations in hilly country, in the eastern half of the area. NES 2713 etc.

Wahlenbergia *Schrad.*

This genus is in need of further revision, and no attempt will be made here to list the species which occur in the area.

GOODENIACEAE

Dampiera *R. Br.* (See Krause 1912.)

D. purpurea *R.Br.* (*D. brownii* F. Muell.). Gibraltar Range. NES 3185

D. stricta (*Sm.*) *R.Br.* Torrington; Gibraltar Range; on acid granite hills. NES 3045.

Goodenia *Sm.* (See Krause 1912.)

G. bellidifolia *Sm.* Widespread and fairly common. NES 2367 etc.

G. glabra *R.Br.* Puddledock; Mingoola Dam site, Severn River, W of Tenterfield; not common. NES 2522 etc.

G. gracilis *R.Br.* Gilgai, S of Inverell; Chiswick, 10 miles S of Armidale; not common. NES 2352; JB.

G. hederacea *Sm.* Somewhat variable; widespread and very common. NES 2892 etc.

G. ovata *Sm.* Blue Hole, 9 miles SE of Armidale. NEU.

G. pinnatifida *Schlecht.* Fairly widespread, but of somewhat sparse occurrence. NES 2836 etc.; JB.

G. rotundifolia *R.Br.* Tenterfield; Torrington. NSW. (Krause 1912.)

Scaevola *L.* (See Krause 1912.)

S. albida (*Sm.*) *Druce.* (*S. microcarpa* Cav.). Tenterfield to Sandy Flat. NSW.

S. hookeri *F. Muell.* Backwater, NE of Guyra; Serpentine River, Point Lookout area, growing in sphagnum swamp; Yarrowitch. NSW; NEU.

S. ramosissima (*Sm.*) *Krause.* (*S. hispida* Cav.). Torrington area. NES 2556.

Velleia *Sm.* (See Krause 1912.)

V. paradoxa *R.Br.* Armidale; Salisbury Plains; Turner records the species from Kelly's Plains. NES 3033; NEU.

STYLIDIACEAE

Stylidium *Swartz.*

S. debile *F. Muell.* var. **paniculatum** *Maiden and Betche.* Type from Boonoo Boonoo; on the edges of small swampy depressions in granite country, in the Jennings and Boonoo Boonoo areas. NES 3726; NSW.

S. graminifolium *Swartz.* Tenterfield to Boonoo Boonoo; Torrington; Howell; Doughboy Range, Ebor area; Chiswick, 10 miles S of Armidale; fairly widespread in the area, most commonly found in hilly granite country. NES 2909 etc; NEU.

S. laricifolium *L. C. Rich.* 7 miles NE of Tenterfield, on Boonoo Boonoo road, in *Eucalyptus campanulata* association, hilly granite country; Silent Grove, N of Torrington, in *Eucalyptus andrewsii* association, hilly granite country. NES 2458 etc.

COMPOSITAE

Ammobium *R.Br.*

A. alatum *R.Br.* Fairly widespread, common on roadsides and waste places, especially in the Guyra area. NES 2283; NEU.

Anthemis *L.*

*__A. cotula__ *L.* Common in Armidale and Guyra townships, as a weed of roadsides and waste places. NES 3152; NEU.

Arctotis *L.*

A. australiensis *Beauv.* Widespread and common. NES 1736 etc.

Arrhenechthites *Mattf.*

A. mixta (*A. Rich.*) *Belcher.* (*Erechtites mixta* (A. Rich.) DC.). Vicinity of Little Mt. Spirabo; not common. NES 2750. (Belcher 1956.)

Aster *L.*

*__A. novi-belgii__ *L.* 5 miles N of Guyra, in area adjoining railway line; not common. NES 3181.

*__A. subulatus__ *Michx.* Baker's Creek, Armidale-Wollomombi road. NEU.

Bidens *L.*

*__B. pilosa__ *L.* Bolivia Range, Glen Innes to Tenterfield; Rock Mountain, Inverell area. NES 3415; NSW.

*__B. tripartita__ *L.* "Seymour", Walcha area. NSW.

Brachycome *Cass.* (See Davis 1948.)

B. aculeata (*Labill.*) *Less.* (*B. scapiformis* DC.). Fairly widespread and fairly common in the area. See Davis 1948 for localities. NES 3030 etc.

B. angustifolia *A. Cunn. ex DC.* var. **heterophylla** (*Benth.*) *G. L. Davis.* (*B. linearifolia* DC. var. *heterophylla* (Benth.) Moore and Betche.) Emmaville; Howell; Tingha.

B. ciliaris (*Labill.*) *Less.* var. **ciliaris.** Between Walcha Road and Wollun; rare. NES 2717.

B. dissectifolia *G. L. Davis.* Holotype from 10 miles SE of Guyra. Common "in roadside ditches and around the margins of swamps", in the Guyra district. See Davis 1948 for localities. NES 3901.

B. diversifolia (*Grah. in Hook.*) *Fisch. and Mey.* var. **dissecta** *G. L. Davis.* Glen Innes; Tingha; Ebor Falls. (Davis 1948.)

B. goniocarpa *Sond. and F. Muell.* 4 miles W of Ashford, on solodic soil derived from porphyry rocks. NES 2034.

B. graminea (*Labill.*) *F. Muell.* Moona Plains, Thomas's Lagoon, SW of Armidale; at Thomas's Lagoon this species is found growing amongst dense grass on the edge of the lagoon. NES 3218.

B. marginata *Benth.* var. **chrysoglossa** (*F. Muell.*) *G. L. Davis.* Severn River, New England; Armidale; Pine Forest, near Armidale. (Davis 1948.)

B. marginata *Benth.* var. **marginata.** Widespread and fairly common throughout the area. See Davis 1948 for localities. NES 2052 etc.

B. microcarpa *F. Muell.* (*B. discolor* C. Stuart ex Benth.). Tenterfield; Emmaville; Torrington; Tent Hill; Gilgai to Stannifer; 9 miles W of Yarrowyck; Gibraltar Range, 40 miles NE of Glen Innes; Glen Innes to Deepwater. NES 2791 etc.

B. multifida *DC.* var. **multifida.** Emmaville; Howell; Tingha area. NES 2375.

B. nova-anglica *G. L. Davis.* Holotype from Dumaresq Creek near Armidale; fairly widespread in the area; "forest land on slopes, frequently among boulders". See Davis 1948. NES 2875.

B. procumbens *G. L. Davis.* Holotype from Blue Hole, near Armidale; also at Dangar's Falls.

B. radicans *Steetz ex Lehmann.* Elderberry Creek, Guyra area; Little Lagoon, 5 miles S of Guyra; 10 miles SE of Guyra; Bullock Creek, Point Lookout area; Guy Fawkes Creek, Ebor area; grows in swampy ground on the margin of lagoons etc. NES 3137.

B. scapigera (*Sieb. ex Spreng.*) *DC.* Fairly widespread in the area. See Davis 1948 for localities; "open forest land, frequently occurring on swampy ground". NES 2756.

B. stuartii *Benth.* Lectotype from New England; Tenterfield; Emmaville area; Howell; Guyra; 4 miles W of Tingha; generally growing in swampy ground in granite and porphyry hill country. NES 1938.

B. tenuiscapa *Hook. f.* var. **pubescens** (*Benth.*) *G. L. Davis.* (*B. decipiens* Hook. f. var. *pubescens* Benth.). Homeotype from Armidale; Bolivia; Glen Innes; Torrington; Parlour Mountains, Booroolong area; Dumaresq Creek, Armidale area; Armidale; 7 miles E of Wollomombi; Uralla; Walcha Road; "Open forest land in well-drained sites", see Davis 1948. NES 2704.

Calocephalus *R.Br.*

C. citreus *Less.* Fairly widespread. NES 1862.

Calotis *R.Br.* (See Davis 1952.)

C. ancyrocarpa *J. M. Black.* Glen Innes. (Davis 1952.)

C. cuneifolia *R.Br.* Widespread and common throughout the area. NES 1631 etc. (Davis 1952.)

C. dentex *R.Br.* Boonoo Boonoo; near Timbarra; Torrington; Emmaville; Pheasant Creek, Glen Elgin; Glen Innes; Tingha; Guyra; Abington; Snowy Range, Ebor area; Uralla; Walcha Road; Moona River, Walcha; fairly widespread in the area, but not common. NES 2742 etc.

C. hispidula (*F. Muell.*) *F. Muell.* 5 miles S of Ashford. NES 3002B.

C. lappulacea *Benth.* Widespread and common throughout the area. NES 2835 etc.

C. multicaulis (*Turcz.*) *Druce.* Glen Innes. (Davis 1952.)

C. scapigera *Hook.* Glen Innes; Armidale; rare. (Davis 1952.)

Carduus *L.*

***C. pycnocephalus** *L.* Fairly widespread, not common. NES 1622 etc.

Carthamus *L.*

***C. lanatus** *L.* Armidale, on roadsides; Glen Innes. NES 3866; BRI.

Cassinia *R.Br.*

C. compacta *F. Muell.* Jennings to Boonoo Boonoo track, hilly granite country. NES 3734.

C. laevis *R.Br.* Fairly widespread and fairly common. NES 197.

C. quinquefaria *R.Br.* Fairly widespread. NES 1916 etc.

C. uncata *A. Cunn. ex DC.* Yellow Gap, Guyra area; Wallangarra. NSW. (Wakefield 1951.)

Centaurea *L.*

***C. calcitrapa** *L.* Armidale area; Dundee, 10 miles S of Deepwater; Wallangarra; a roadside weed. NES 3890; BRI.

***C. jacea** *L.* Tenterfield. NSW.

***C. melitensis** *L.* Fairly widespread, mainly on roadsides. NES 2389 etc.

***C. solstitialis** *L.* Fairly widespread, generally on roadsides in the vicinity of towns. NES 1876.

Centipeda *Lour.*

C. cunninghamii (*DC.*) *A.Br. et Aschers.* (*Myriogyne cunninghamii* DC.). Blue Hole; Chiswick, 10 miles S of Armidale; Glen Innes to Deepwater. CANB; CSA; NEU.

C. minima (*L.*) *A.Br. et Aschers.* Fairly widespread but of sparse occurrence. NES 2673; NEU.

Chrysanthemum *L.*

***C. leucanthemum** *L.* Fairly widespread, and fairly common on roadsides especially from Glen Innes to Guyra. NES 1846; NEU.

Cichorium *L.*

***C. intybus** *L.* Glen Innes; Armidale; on roadsides in the vicinity of both towns. NES 3821; NEU.

Cirsium *Mill.*

***C. vulgare** (*Savi*) *Ten.* (*C. lanceolatum* (L.) Scop. non Hill). Widespread and common.

Coreopsis *L.*

***C. lanceolata** *L.* Tenterfield, on roadsides. NES 3718.

Cotula *L.*

C. australis (*Sieb. ex Spreng.*) *Hook. f.* Fairly widespread and fairly common in the area. NES 2078 etc.; NEU.

C. filicula (*Hook. f.*) *Hook. f. ex Benth.* Point Lookout. NEU.

Craspedia *Forst. f.*

C. uniflora *Forst. f.* (*C. richea* Cass.). Widespread and fairly common. NES 2312. etc.

Crepis *L.*

***C. capillaris** (*L.*) *Wallr.* (*C. virens* L.). University grounds, Armidale; Chiswick, 10 miles S of Armidale; fairly common in the vicinity of towns. NES 2933 etc.; NEU; CANB.

Cryptostemma *R.Br.*

***C. calendula** (*L.*) *Druce.* (*C. calendulaceum* (L.) R.Br.). Ashford area on roadsides, not common. NES 3003.

Erigeron *L.* (See Burtt 1948.)

***E. bonariensis** *L.* (*E. linifolius* Willd.; *E. crispus* Pourr.). Armidale; Uralla; Guyra; Walcha Road; fairly common in old cultivation and waste places in the vicinity of towns. NES 3480; NSW.

***E. canadensis** *L.* Armidale; Uralla; fairly common on waste places in the towns. NES 3176.

***E. floribundus** (*H.B.K.*) *Sch. Bip.* Common in towns and on roadsides throughout the area. NES 2927 etc.

Galinsoga *Ruiz et Pav.*

***G. parviflora** *Cav.* Armidale. NEU.

Glossogyne *Cass.*

G. tenuifolia (*Labill.*) *Cass.* Yarrowyck area; Mingoola Dam site, approximately 40 miles W of Tenterfield; Blue Hole, Armidale area; generally found on quartzite hills, mainly in the western half of the area. NES 2594 etc.; NEU.

Gnaphalium *L.*

G. japonicum *Thunb.* (Includes *G. collinum* Labill.). Widespread and common throughout the area. NES 2289 etc.

G. luteoalbum *L.* Yarrowyck and Toryburn areas, growing in *Eucalyptus blakelyi—E. melliodora* association near creeks; not common. NES 2834 etc.

G. purpureum *L.* 7 miles W of Yarrowyck, on granite hill; Chiswick, 10 miles S of Armidale. NES 2143.

Hedypnois *Schreb.*

***H. rhagadioloides** (*L.*) *Willd.* ssp. **cretica** (*L.*) *Hayek.* (*H. cretica* (L.) Willd.; *H. polymorpha* DC.). Inverell; Pindari to Ashford; fairly common on roadsides in the north-western portion of the area. NES 2030.

Helichrysum *Mill. corr. Pers.*

H. adnatum (*DC.*) *Benth.* Walcha area. (Willis 1950.)

H. apiculatum (*Labill.*) *DC.* Extremely variable; widespread and very common. NES 2276 etc.

H. boormanii *Maiden and Betche.* 7 miles NE of Tenterfield, on Woodenbong road; Boonoo Boonoo; in granite hill country; not common. NES 2463. (Maiden and Betche 1905.)

H. bracteatum (*Vent.*) *Andr.* This species shows a great deal of variation in vegetative characters. Widespread and fairly common in a wide range of habitats, and often found in the fenced-off areas adjoining railway lines. NES 1851 etc.; NEU.

H. collinum *DC.* Bismuth, NW of Torrington; Emmaville; Turner records the species from Black Mountain. NSW.

H. diosmifolium (*Vent.*) *Sweet.* Gibraltar Range, 40 miles NE of Glen Innes; Moona Plains; Jennings to Boonoo Boonoo. NES 3236 etc. (Burbidge 1958.)

H. obcordatum (*DC.*) *F. Muell. ex Benth.* Howell. NES 2786.

H. rutidolepis *DC.* Rigney Creek, Ebor area; 5 miles from Booroolong on Guyra road. NEU.

H. scorpioides *Labill.* Yarrow Creek area; Ebor to Aberfoyle; not common. NES 2730 etc.; NEU.

H. semipapposum (*Labill.*) *DC.* Sometimes difficult to separate from some forms of *H. apiculatum* (Labill.) DC. Fairly widespread, but not as common as the latter species. NES 1860 etc.

Helipterum *DC.*

H. anthemoides (*Sieb. ex Spreng.*) *DC.* Doughboy Range, Ebor area; Parlour Mountains, Booroolong area; not common. NES 2895 etc.

H. australe (*A. Gray*) *Druce.* (*H. dimorpholepis* Benth.). Widespread and very common. NES 1742 etc.

H. albicans (*A. Cunn.*) *DC.* Fladbury, W of Dundee; 7 miles W of Yarrowyck; Murson Creek, Boonoo Boonoo to Wilson's Downfall; not common. NES 2709 etc. (Wilson 1960.)

Hypochoeris *L.*

***H. glabra** *L.* Fairly widespread, but of somewhat sparse occurrence. NES 2951 etc.

***H. radicata** *L.* Widespread and very common. NES 1714 etc.

Isoetopsis *Turcz.*

I. graminifolia *Turcz.* Gara River, E of Armidale; Castle Doyle; Chiswick, 10 miles S of Armidale; not common. NES 3491; NEU; JB.

Ixiolaena *Benth.*

I. leptolepis (*DC.*) *Benth.* Of sparse occurrence, mainly in the western half of the area.

Lactuca *L.*

***L. saligna** *L.* Armidale township, on roadsides and waste places; Chandler's Peak, Guyra. NES 3143; BRI.

***L. serriola** *L.* (*L. scariola* L.). Common in towns, on roadsides and waste places.

Lagenophora *Cass.* (See Davis 1950.)

L. stipitata (*Labill.*) *Druce.* (*L. billardieri* Cass.). Widespread and common. NES 2597 etc.; NEU.

Leptorhynchos *Less.*

L. squamatus (*Labill.*) *Less.* Widespread and fairly common. NES 1755 etc.

Matricaria *L.*

Matricaria sp. Glen Innes. NSW; BRI.

Microseris *D. Don.*

M. forsteri *Hook. f.* (*M. scapigera* (Sol. ex Forst.) Sch.-Bip.). Widespread, but of diffuse occurrence. NES 1757 etc.

Olearia *Moench*

O. alpicola *F. Muell.* Ebor Falls. NEU.

O. canescens *Hutchinson.* (*O. stellulata* var. *canescens* Benth.). Tenterfield; Apsley River (ravines). (Hutchinson 1917.)

O. gravis *F. Muell.* Wallangarra. NSW.

O. myrsinoides (*Labill.*) *F. Muell.* Longford, on porphyry hill country; not common. NES 2947.

O. ramosissima (*DC.*) *Benth.* 7 miles S of Tingha; Torrington and Howell areas; not common. NES 1678. (Cambage 1908; Maiden 1906.)

O. ramulosa (*Labill.*) *Benth.* Torrington; Howell; Parlour Mountains, Booroolong area; Doughboy Range, Ebor area. Found in hilly granite and porphyry country; of somewhat diffuse occurrence. NES 1514 etc.; NEU.

O. rosmarinifolia (*DC.*) *Benth.* Wongwibinda area; rare. NES 2431.

O. viscidula (*F. Muell.*) *Benth.* Parlour Mountains, Booroolong area; Yarrowyck. NES 1810 etc.; NEU.

Olearia sp. aff. **O. chrysophylla** (*A. Cunn.*) *Benth.* 19 miles E of Glen Innes on Grafton Road, granite hill. NES 3005B.

Olearia sp. aff. **O. elliptica** *DC.* Mingoola Dam site, Severn River, 40 miles W of Tenterfield; 20 miles S of Tingha; 7 miles W of Yarrowyck, on Toryburn Road. Of sparse occurrence in hilly quartzite country in the western half of the area.

Picris *L.*

***P. hieracioides** *L.* Fairly widespread but of somewhat sparse occurrence; generally in damp areas on roadsides and the fenced-off areas adjoining railway lines. NES 3177 etc.; BRI.

Podolepis *Labill.* (See Davis 1956.)

P. arachnoidea (*Hook.*) *Druce.* (*P. rutidochlamys* F. Muell. ex Benth.). Wallangarra; Wallangra, Inverell area; Tingha. (Davis 1956.)

P. jaceoides *(Sims) Voss.* (*P. acuminata* R.Br.; *P. jaceoides* (Sims) Druce; *P. jaceoides* (Sims) Domin). Tenterfield; Glen Innes; Stonehenge; Chandler's Peak, Guyra area; Ebor Falls; Point Lookout; Armidale; 9 miles N of Carlisle's Gully, on New England Highway; Walcha Road; Walcha area; Tia area; fairly common throughout the area " amongst grasses in open situations and forest land," and often common in the fenced-off areas adjoining the railway line. NES 2275 etc. (Davis 1956.)

P. neglecta *G. L. Davis.* Wallangarra; 2 miles N of Tenterfield, railway line enclosure; vicinity of Little Mt. Spirabo, *Eucalyptus campanulata* association. steep slope of quartzite hill; Torrington; Glen Innes; Howell; 6 miles N of Bundarra, on road to Inverell; of somewhat sparse occurrence. NES 2765 etc. (Davis 1956.)

Senecio *L.*

S. bipinnatisectus *Belcher.* (*Erechtites atkinsoniae* F. Muell.). Top of Pheasant Mountain, near Backwater. NES 3464.

S. biserratus *Belcher.* (*Erechtites prenanthoides* Benth., non DC.). Maryland to Wylie Creek. NES 3772.

S. gunnii (*Hook. f.*) *Belcher.* (*Erechtites gunnii* Hook. f.; *Erechtites quadridentata* var. *gunnii* (Hk.f.) Benth.). Walcha Road; Point Lookout. NES 2887. (Belcher 1956.)

S. hispidula *A. Rich.* var. **dissectus** (*Benth.*) *Belcher.* (*Erechtites arguta* var. *dissecta* Benth.). Black Mountain. Bell's paddock; Fraser's Creek Crossing, Inverell Road; Armidale; Apsley Falls. NEU; NSW. (Belcher 1956.)

S. lautus *Forst. f. ex Willd.* A polymorphic species, showing extreme variation in vegetative characters. Ebor Falls; Apsley Falls; Howell; Pheasant Mountain, Backwater area; etc. NES 3156 etc.; NEU.

S. quadridentatus *Labill.* (*Erechtites quadridentata* (Labill.) DC.). Fairly widespread but of sparse occurrence. NES 2620 etc.

S. vagus *F. Muell.* Lookout Point, Gibraltar Range, 30 miles NE of Glen Innes. NSW.

Sigesbeckia *L.*

S. orientalis *L.* Apsley Falls; Blue Hole; Balala area; Yarrowyck; 11 miles E of Ashford. Widespread but of somewhat sparse occurrence, generally in hilly porphyry and quartzite country. NES 2177 etc.; NEU.

Silybum *Adans.*

***S. marianum** (*L.*) *Gaertn.* (*Carduus marianus* L.). Inverell area, on roadsides and the banks of creeks. NES 3028.

Solenogyne *Cass.* (See Davis 1950.)

S. bellioides *Cass.* var. **bellioides.** (*Lagenophora solenogyne* F. Muell. ex Benth.). Widespread and very common. NES 2993 etc.

S. bellioides *Cass.* var. **gunnii** (*Hook.f.*) *G. L. Davis.* (*Lagenophora emphysopus* Hook. f., *L. gunnii* (Hook.f.) J. M. Black). 1 mile W of Yarrow Creek, on road to Glencoe ; 8 miles E of Wollomombi, on road to Kempsey ; Moona Plains ; Glen Innes; Ebor Falls ; Armidale, University College. NES 2626 etc.

Soliva *Ruiz et Pav.* (See Cabrera 1949; Healy 1953.)

***S. pterosperma** (*Juss.*) *Less.* (*S. sessilis* auct. austral.). 7 miles W of Yarrowyck, *Eucalyptus blakelyi* association near creek; Chiswick, 10 miles S of Armidale. NES 2121.

Sonchus *L.*

*****S. asper** (*L.*) *Hill.* Common on roadsides and waste places, especially in granite country. NES 2299 etc.

*****S. oleraceus** *L.* Fairly common on waste places in towns.

Stuartina *Sond.*

S. hamata *Philipson.* Base of Mt. Duval, NW of Armidale; rare. NEU.

Taraxacum *Weber.*

*****T. officinale** *Weber* sens. lat. Very variable ; common in towns.

Tolpis *Adans.*

*****T. umbellata** *Bartol.* Fairly widespread on roadsides etc., but of somewhat sparse occurrence. NES 2291 etc.

Tragopogon *L.*

*****T. porrifolius** *L.* Glen Innes area, on roadsides. NES 3823; BRI.

Verbesina *L.*

*****V. encelioides** (*Cav.*) *A. Gray.* Yarrowyck, growing in sheep yards. CSA.

Vernonia *Schreb.*

V. cinerea (*L.*) *Less.* Ebor Falls; 3 miles N of Cope's Creek, S of Gilgai; 6 miles N of Bundarra, on Inverell road; 4 miles W of Tingha; Strathbogie; turnoff to Mt. Spirabo, on New England Highway; Mingoola Dam site, Severn River 40 miles W of Tenterfield. Fairly widespread but of sparse occurrence, most commonly found in hilly granite and quartzite country in the western half of the area. NES 2776 etc.; NEU.

Vittadinia *A. Rich.*

V. brachycomoides (*F. Muell.*) *Benth.* 1 mile N of Howell, on granite hill; 3 miles E of Inverell, *Eucalyptus albens* association; fairly rare. NES 2800, 2784.

V. triloba (*Gaudich.*) *DC.* sens. lat. Extremely variable; widespread and very common. NES 1794 etc.

Xanthium *L.*

*****X. chinense** *Mill.* (*X. pungens* Wallr.). Aberfoyle area, few plants near creek. NES 3417.

*****X. spinosum** *L.* Armidale area.

Zinnia *L.*

*****Z. pauciflora** *L.* Mingoola Dam site, Severn River, 40 miles W of Tenterfield; rare plants growing on a quartzite hill. NES 2533.

LITERATURE CITED

Anderson, R. H., 1939.—The Naturalised Flora of N.S.W. (Excluding Gramineae.). Contrib. N.S.W. Nat. Herb., I, No. 1, 16-33.

Anderson, R. H., 1957.—The Trees of N.S.W. 3rd. Edit., Sydney.

Andrew, W. D., 1941.—Pasture Plants of Victoria. The Foxtail Grasses (Genus *Alopecurus*.) Journ. Ag. Vict., XXXIX, 586-590.

Baker, R. T., 1897.—Contributions to a Knowledge of the Flora of Australia. No. 1. Proc. Linn. Soc. N.S.W., XXII, 230-239.

Baylis, G. T. S., 1954.—Chromosome Number and Distribution of *Solanum aviculare* Forst., and *S. laciniatum* Ait. Trans. Roy. Soc. N. Zeal., LXXXII, Pt. 3, 639-643.

Belcher, R. O., 1956.—A revision of the Genus *Erechtites* (Compositae), with Inquiries into *Senecio* and *Arrhenechtites.* Ann. Miss. Bot. Gdns., XLIII, No. 1, 1-85.

Benl, G., 1940.—Die Systematik der Gattung *Gahnia* Forst. Botanisches Archiv., XL, 151-257.

Bentham, G., 1863-1878.—Flora Australiensis. London.

Betche, E., 1912—Key to the N.S.W. Genera and Species of Goodeniaceae. Austral. Nat., XI, 157-165.

Black, J. M., 1943-1952.—Flora of South Australia. 2nd Edit., Parts 1-3. Adelaide.

Blake, S. T., 1939.—A Monograph of the Genus *Eleocharis* in Australia and New Zealand. Univ. Qld. Papers, Dept. Biol., I, No. 9, 88-132.

Blake, S. T., 1940.—Notes on Australian Cyperaceae IV. Univ. Qld. Papers, Dept. Biol., I, No. 17, 177-182.

Blake, S. T., 1941.—Studies in Queensland Grasses. Univ. Qld. Papers, Dept. Biol., I, No. 18, 1-22.

Blake, S. T., 1944.—Monographic Studies in the Australian Andropogoneae. Part I, Univ. Qld. Papers, Dept. Biol., XI, No. 3, 1-62. (Contains Revisions of the Genera *Bothriochloa, Capillipedium, Chrysopogon, Vetiveria* and *Spathia*).

Blake, S. T., 1947.—Notes on Australian Cyperaceae VII. Proc. Roy. Soc. Queensl., LVIII, 35-50.

Blake, S. T., 1952.—The Identification and Distribution of some Cyperaceae and Gramineae., Chiefly from Australia. Proc. Roy. Soc. Queensl., LXII, No. 10, 83-100. (Contains Key to the Aust. species of *Echinochloa.*)

Blakely, W. F., 1922.—The Loranthaceae of Australia, Pt. i. Proc. Linn. Soc., N.S.W., XLVII, 1-25.

Blakely, W. F., 1922.—The Loranthaceae of Australia, Pt. ii. Proc. Linn. Soc. N.S.W., XLVII, 199-222.

Blakely, W. F., 1922.—The Loranthaceae of Australia, Pt. iii. Proc. Linn. Soc. N.S.W., XLVII, 391-414.

Blakely, W. F., 1923.—The Loranthaceae of Australia, Pt. iv. Proc. Linn. Soc. N.S.W., XLVIII, 130-152.

Blakely, W. F., 1924.—The Loranthaceae of Australia, Pt. v. Proc. Linn. Soc. N.S.W., XLIX, 79-96.

Blakely, W. F., 1925.—The Loranthaceae of Australia, Pt. vi. Proc. Linn. Soc. N.S.W., L, 1-24.

Blakely, W. F., 1928.—The Loranthaceae of Australia, Pt. vii. Proc. Linn. Soc. N.S.W., LIII, 31-50.

Blakely, W. F., 1930.—Another New Species of *Eucalyptus* from New England. Proc. Linn. Soc. N.S.W., LV, 594-595.

Blakely, W. F., 1934.—A Key to the Eucalypts. 2nd Edit. Melbourne. (1955).

Blakely, W. F., 1939.—A Key to the New South Wales Species of *Dillwynia.* Austral. Nat., X, 181-187.

Blakely, W. F., 1941.—Additions to the Australian Flora. Contrib. N.S.W. Nat. Herb., I, No. 3, 120-124.

Blakely, W. F., and McKie, E. N., 1930.—Additions to the Flora of New England, N.S.W. Proc. Linn. Soc. N.S.W., LV, 587-593.

Boivin, B., 1948.—*Westringia*, an Australian Genus of Labiatae. Proc. Roy. Soc. Qld., LX, 99-110.

Braid, K. W., 1925.—Revision of the Genus *Alphitonia*. Kew Bull., No. 4, 168-186.

Briggs, B. G., 1959.—*Ranunculus lappaceus* and Allied Species of the Australian Mainland. Proc. Linn. Soc. N.S.W., LXXXIV, 295-324.

Buchenau, Fr., 1906.—*Juncaceae*. Das Pflanzenreich, Heft 25. Leipzig.

Burbidge, N. T., 1941.—A Revision of the Australian Species of *Enneapogon* Desv. Proc. Linn. Soc. Lond., 153rd. Session, Pt. 1, 52-91.

Burbidge, N. T., 1958.—A Monographic Study of *Helichrysum* subgenus *Ozothamnus* (Compositae) and of two Related Genera Formerly Included Therein. Aust. Journ. Bot., VI, 229-284.

Burbidge, N. T., 1960—The Australian Species of *Nicotiana* L. (Solanaceae). Aust. Journ. Bot., VIII, 342-380.

Burtt, B. L., 1948.—On *Erigeron bonariensis* Linn. Kew Bull., No. 3, 369-372.

Burtt, B. L. and Hill, A. W., 1935.—The Genera *Gaultheria* and *Pernettya* in New Zealand, Tasmania, and Australia. Jour. Linn. Soc. Lond., XLIX, 611-644.

Cabrera, A. L. 1949.—Sinopsis del Genero *Soliva* (Compositae). Notas del Museo de La Plata, Tomo XIV, Botanico No. 70, 123-139.

Cambage, R. H., 1904.—Notes on the Native Flora of N.S.W. Pt. ii. The Western Slopes of New England. Proc. Linn. Soc. N.S.W., XXIX, 781-797.

Cambage, R. H., 1908.—Notes on the Native Flora of N.S.W. Pt. vi. Deepwater to Torrington and Emmaville. Proc. Linn. Soc. N.S.W., XXXIII, 45-65.

Cambage, R. H., 1914.—Dimorphic Foliage of *Acacia rubida*, and Fructification During Bipinnate Stage. Proc. Roy. Soc. N.S.W., XLVIII, 136-139.

Carolin, R. C. 1958.—The Species of the Genus *Erodium* L'Hér. Endemic to Australia. Proc. Linn. Soc. N.S.W., LXXXIII, 92-100.

Cheel, E., 1923.—Notes on the Genera *Darwinia*, *Homoranthus*, and *Rylstonea*, in New South Wales, Queensland, and South Australia. Proc. Roy. Soc. N.S.W., LVI, 62-77.

Cheel, E., 1924.—Notes on *Boronia* in the Pinnatae Section, with a Description of a New Species. Proc. Roy. Soc. N.S.W., LVIII, 145-149.

Cheel, E., 1924.—Notes on *Melaleuca*. Proc. Roy. Soc. N.S.W., LVIII, 189-197.

Cheel, E., 1925.—Two New Species of *Callistemon*, with Notes on Certain Other Species. Proc. Linn. Soc. N.S.W., L, 259-266.

Cheel, E., 1927.—Description of Four New Species of *Boronia*. Proc. Roy. Soc. N.S.W., LXI, 401-414.

Cheel, E., 1928.—Further Notes on the Genus *Boronia*. Proc. Roy. Soc. N.S.W., LXII, 290-302.

Clapham, A. R., Tutin, T. G., Warburg, E. F. 1952.—Flora of the British Isles. Cambridge Univ. Press.

Cooper, R. C., 1956.—The Australian and New Zealand Species of *Pittosporum*. Ann. Miss. Bot. Gdn., XLIII, No. 2, 87-188.

Copeland, E. B., 1947.—Genera Filicum. Chronica Botanica Co., Waltham, Mass., U.S.A.

Cross, D. O., 1943.—Rough-bearded Grasses (*Echinopogon* spp.). A Key to Their Identification. Ag. Gaz. N.S.W., LIV, 554-558.

Cross, D. O., and Vickery, J. W. 1950.—List of the Naturalised Grasses in New South Wales. Contrib. N.S.W. Nat. Herb., I, No. 5, 275-280.

Curtis, W. M., 1952.—Variation in Certain Tasmanian Plants. New Phyt., LI, 398-416.

Danser, B. H., 1927.—A Revision of the Queensland Polygona. Proc. Roy. Soc. Queensl., XXXIX, No. 3, 23-42.

Danser, B. H., 1929.—On the Taxonomy and the Nomenclature of the Loranthaceae of Asia and Australia. Bulletin du Jardin Botanique Buitenzorg, X, 291-373.

Davis, G. L. 1948.—Revision of the Genus *Brachycome* Cass. Part 1. Australian Species. Proc. Linn. Soc. N.S.W., LXXIII, 142-241.

Davis, G. L., 1950.—A Revision of the Australian species of the Genus *Lagenophora* Cass. Proc. Linn. Soc. N.S.W., LXXV, 122-132.

Davis, G. L., 1950.—Revision of the Genus *Solenogyne* Cass. Proc. Linn. Soc. N.S.W., LXXV, 188-194.

Davis, G. L., 1952.—Revision of the Genus *Calotis* R. Br. Proc. Linn. Soc. N.S.W., LXXVII, 146-188.

Davis, G. L., 1956.—Revision of the Genus *Podolepis* Labill. Proc. Linn. Soc. N.S.W., LXXXI, 245-286.

Diels, L. 1906.—Droseraceae. Das Pflanzenreich, Heft 26. Leipzig.

Ding Hou 1955.—A Revision of the Genus *Celastrus*. Ann. Miss. Bot. Gard., XLII, No. 3, 215-302.

Du Rietz, G. E., 1948.—Taxonomical Notes on some Tasmanian Species of *Euphrasia*. Svensk. Botanisk. Tidskrift., Bd. 42, H2, 99-115, 348-363. (Contains Key to the Tasmanian species and discussion of some N.S.W. species.)

Eichler, H. J., 1958. — The *Ranunculus sessiliflorus* Group in South Australia. Trans. Roy. Soc. S. Australia., LXXXI, 175-183.

Engler, A. and Gilg, E., 1924.—Syllabus der Pflanzenfamilien, Aufl. 9-10. Berlin.

Garden, J., 1957.—A Revision of the Genus *Callitris* Vent. Contrib. N.S.W. Nat. Herb., II, No. 5, 363-392.

Goodspeed, T. H., 1954.—The Genus *Nicotiana*. Chronica Botanica Co., Waltham, Mass., U.S.A.

Grant, A. L., 1924.—A Monograph of the Genus *Mimulus*. Ann. Miss. Bot. Gdn., XI, 99-388.

Healey, A. J., 1953.—The Genus *Soliva* (Compositae) in New Zealand. Trans. Roy. Soc. N. Zeal., LXXXI, Pt. 1, 23-26.

Henrard, J. Th., 1929-1932.—A Monograph of the Genus *Aristida*. 2 Vols. Leiden.

Henrard, J. Th., 1950.—Monograph of the Genus *Digitaria*. Leiden.

Hill, A. W., 1927.—The Genus *Lilaeopsis*. Jour. Linn. Soc. Lond., XLVII, 525-552.

Hubbard, C. E., 1935.—Species Novae vel Minus Cognitae. Hooker's Icones Plantarum, t. 3261. (Contains Enumeration and Key to the Species of *Echinopogon*.)

Hubbard, C. E., 1938.—Species Novae vel Minus Cognitae. Hooker's Icones Plantarum, t. 3264. (Contains Key to the Species of *Sorghum* found in Australia.)

Hughes, D. K., 1921.—A Revision of the Australian Species of *Stipa*. Kew Bull., No. 1, 1-30.

Hughes, D. K., 1923.—The Genus *Panicum* of the Flora Australiensis. Kew Bull., No. 9, 305-332.

Hunt, E. T., and Rupp, H. M. R., 1948.—A Review of the Genus *Bulbophyllum*, (Orchidaceae) In Australia. Proc. Roy. Soc. Qld., LX, No. 6, 55-68. (1950.) (Contains Key to Aust. species.)

Hutchinson, J., 1917.—*Olearia gunniana* and its Allies. Gardener's Chronicle, 3rd Ser., LXI.

Hutchinson, J., 1934.—The Families of Flowering Plants, II. Monocotyledons. London.

Johnson, L. A. S., 1959.—The Families of Cycads and the Zamiaceae of Australia. Proc. Linn. Soc. N.S.W., LXXXIV, 64-I17.

Koyama, T., 1956.—Taxonomic Study of Cyperaceae. V. A New Classification of the Genus *Cladium* in a Wide Meaning. Bot. Mag. Tokyo, LXIX, 59-67.

Krause, K., 1912.—Goodeniaceae-Brunoniaceae. Das Pflanzenreich, Heft 54. Leipzig.

Kükenthal, G., 1936.—Cyperaceae. Scirpoideae-Cypereae. Das Pflanzenreich, Heft. 101. Leipzig. (Reprinted 1956.)

Kükenthal, G., 1942.—Vorarbeiten zu einer Monographie der Rhynchosporoideae XII. Fedde. Rep., LI, 1-17, 139-193. (Contains a revision of the Genus *Cladium*.)

Kükenthal, G., 1943.—Vorarbeiten zu einer Monographie der Rhynchosporoideae XIII. Fedde. Rep., LII, 52-111. (Contains a revision of the genus *Gahnia*.)

Kükenthal, G. 1944.—Vorarbeiten zu einer Monographie der Rhynchosporoideae. XIV. Fedde, Rep. Sp. Nov., LIII, 85-100. (Contains a revision of the genus *Caustis*.)

Lee, A. T., 1948.—The Genus *Swainsona*. Contrib. N.S.W. Nat. Herb., I, No. 4, 131-271.

Lothian, N., 1946.—Critical Notes on the Genus *Wahlenbergia* Schrad. With Descriptions of New Species in the Australian Region. Proc. Linn. Soc. N.S.W., LXXI, 201-235.

Maiden, J. H., 1906.—Botany of Howell (Bora Ck.). A Tin-Granite Flora. Proc. Linn. Soc. N.S.W., XXXI, 63-72.

Maiden, J. H., 1909-1933.—A Critical Revision of the Genus *Eucalyptus*. Govt. Printer N.S.W., Sydney.

Maiden, J. H., 1919.—Notes on *Acacia*. Proc. Roy Soc. N.S.W., LIII, 171-238.

Maiden, J. H., 1920.—Notes on two Acacias. Proc. Roy. Soc. N.S.W., LIV, 227-232.

Maiden, J. H., and Betche, E., 1899.—Notes from the Botanic Gardens, Sydney, No. 4. Proc. Linn. Soc. N.S.W., XXIV, 143-153.

Maiden, J. H., and Betche, E., 1901.—Notes from the Botanic Gardens, Sydney, No. 7. Proc. Linn. Soc. N.S.W., XXVI, 79-90.

Maiden, J. H., and Betche, E., 1904.—Notes from the Botanic Gardens, Sydney, No. 10. Proc. Linn. Soc. N.S.W., XXXII, 734-750.

Maiden, J. H., and Betche, E., 1905.—Notes from the Botanic Gardens, Sydney, No. 11. Proc. Linn. Soc. N.S.W., XXX, 354-375.

Maiden, J. H., and Betche, E., 1906.—Notes from the Botanic Gardens, Sydney. No. 12. Proc. Linn., Soc. N.S.W., XXXI, 731-742.

Maiden, J. H., and Betche, E., 1908.—Notes from the Botanic Gardens, Sydney, No. 13. Proc. Linn. Soc. N.S.W., XXXIII, 304-319.

Maiden, J. H., and Betche, E., 1910.—Notes from the Botanic Gardens, Sydney, No. 16. Proc. Linn. Soc. N.S.W., XXXV, 788-802.

Maiden, J. H., and Betche, E., 1913.—Notes from the Botanic Gardens, Sydney, No. 18. Proc. Linn. Soc. N.S.W., XXXVIII, 242-252.

Maiden, J. H., and Betche, E., 1916.—A Census of New South Wales Plants. Govt. Printer, Sydney.

Maiden, J. H., and Blakely, W. F., 1926.—Descriptions of Fifteen New Acacias. Proc. Roy. Soc. N.S.W., LX, 171-196.

Malme, G. O., 1927.—De Nonnullis Speciebus Xyridis Praecipue Australiensibus et Asiaticis. Svensk Bot. Tidsk., Bd. 21, H4, 381-396. (Contains Key to the Australian Perennial species of *Xyris*.)

Mathias, M. E., and Constance, L., 1955.—The Genus *Oreomyrrhis* (Umbelliferae) Univ. of California Publ. in Bot., XXVII, No. 6, 347-416.

Melvaine, A. T., 1936.—A Check List of the New South Wales Pteridophytes. Proc. Linn. Soc. N.S.W., LXI, 111-121.

Melvaine, A. T., 1940.—A Revision of the Genus *Typha* L. in New South Wales· Contrib. N.S.W. Nat. Herb., I, No. 2, 83-91.

Melville, R., 1955.—Some Ranunculi of Tasmania and South-Eastern Australia. Kew Bull., No. 2, 193-220.

Melville, R., 1956.—The *Ranunculus sessiliflorus* complex in Australia. Kew Bull., No. 2, 277-286.

Millington, R. J., 1954.—*Sphagnum* Bogs of the New England Plateau, New South Wales. Jour. Ecol., XLII, No. 2, 328-344.

Moore, C., and Betche, E., 1893.—Handbook of the Flora of New South Wales. Govt. Printer, Sydney.

Morris, P. F., 1934.—Some Notes on the Grass Genus *Amphibromus*. Vict. Nat., LI, 144-147. (Contains Illustrations and Key.)

Nelmes, E., 1944.—A Key to the Australian Species of *Carex* (Cyperaceae.) Proc. Linn. Soc. Lond., Sess. 155, Pt. 3, 277-285.

Oliver, W.R.B., 1935. — The Genus *Coprosma*. B.P. Bishop Museum, Honolulu, Bull. CXXXII, 1-207.

Paterson, B. R., 1957.—Revision of the Genus *Melichrus* R.Br. (Epacridaceae). Proc. Linn. Soc. N.S.W., LXXXII, Pt. 3, 303-313.

Paterson, B. R., 1960.—Revision of the Genus *Acrotriche* R.Br. Proc. Linn. Soc. N.S.W., LXXXV, 75-93.

Pfeiffer, H., 1925.—Revision der Gattung *Caustis* R. Br. Fedde Rep., XXI, 362-367.

Pryor, L. D., 1950.—A Hybrid *Eucalyptus*. Proc. Linn. Soc. N.S.W., LXXV, 96-98.

Pryor, L. D., 1951.—A Genetic Analysis of Some *Eucalyptus* Species. Proc. Linn. Soc. N.S.W., LXXVI, 140-148.

Pryor, L. D., 1955.—The Genetic and Systematic Status of *Eucalyptus huberiana* Naudin., *E. viminalis* Labill., and *E. aromaphloia* Prior and Willis. Trans. Roy. Soc. S. Aust., 78, 156-164.

Radlkofer, L., 1933.—Sapindaceae. Das Pflanzenreich, Heft. 98 (Reprinted 1956). Weinheim/Bergstr.

Roe, R., 1947.—Preliminary Survey of the Natural Pastures of the New England District of New South Wales, and a General Discussion of their Problems. Commonwealth of Australia, C.S.I.R. Bull. 210. Melbourne.

Rothmaler, W., 1955.—*Alchemilla* und *Aphanes* in Australien. Fedde Rep., Band 58, Heft 1/3, 307-315.

Ruhland, W. 1903.—Eriocaulaceae. Das Pflanzenreich, Heft 13. Leipzig.

Rupp, H. M. R., 1943.—The Orchids of New South Wales. Sydney.

Rupp, H. M. R., 1948.—The Section Genoplesium in the Genus *Prasophyllum*. Vict. Nat., LXV, 141-154. (Contains Key to the section.)

Rupp, H. M. R., 1951.—A Review of the Australian Species of *Sarcochilus* (Orchidaceae.) Proc. Linn. Soc. N.S.W., LXXVI, 49-56. (Contains Key to Aust. species.)

Rupp, H. M. R., 1953.—Notes on Australian Orchids. Vict. Nat., LXIX, No. 9, 116-120.

Shaw, H. K. A., and Turrill, W. B., 1928.—Asperulae Australiensis. Kew Bull., No. 3, 81-105.

Tindale, M., 1955.—Some Notes on the Genus *Polystichum* in South-eastern Australia. Proc. Linn. Soc. N.S.W., LXXX, 53-56.

Tindale, M., 1956.—The Cyatheaceae of Australia. Contrib. N.S.W. Nat. Herb., II, No. 4, 327-361.

Tindale, M., 1957.—A new Combination in *Pleurosorus*. Vict. Nat., LXXIII, 10, 169.

Tindale, M., 1957.—A Preliminary Revision of the Genus *Lastreopsis* Ching. Vict. Nat., LXXIII, No. 11, 180-185.

Turner, F., 1903.—The Vegetation of New England, New South Wales, Proc. Linn. Soc. N.S.W., XXVIII, 276-311.

Vickery, J. W., 1939.—Revision of the Indigenous Species of *Festuca* Linn. in Australia. Contrib. N.S.W. Nat. Herb. I, No. 1, 5-15.

Vickery, J. W., 1940.—A Revision of the Australian Species of *Deyeuxia* Clar. ex Beauv., with Notes on the Status of the Genera *Calamagrostis* and *Deyeuxia*. Contrib. N.S.W. Nat. Herb., I, No. 2, 43-82.

Vickery, J. W., 1941.—A Revision of the Australian Species of *Agrostis* Linn. Contrib. N.S.W. Nat. Herb,. I, No. 3, 101-119.

Vickery, J. W., 1950.—The Species of *Amphipogon* R. Br. Contrib. N.S.W. Nat. Herb., I, No. 5, 281-295.

Vickery, J. W., 1950.—Contributions to the Taxonomy of Australian Grasses. Contrib. N.S.W. Nat. Herb., I, No. 6, 322-343.

Vickery, J. W., 1952.—*Pseudoraphis spinescens* (R.Br.) n. comb., and some Records of New South Wales Grasses. Proc. Roy. Soc. Qld., LXII, No. 7, 69-72.

Vickery, J. W., 1953.—A Census of the Native Gramineae of New South Wales. Contrib. N.S.W. Nat. Herb., II, No. 1, 67-87.

Vickery, J. W., 1956.—A Revision of the Australian Species of *Danthonia* DC. Contrib. N.S.W. Nat. Herb. II, No. 3, 249-325.

Wakefield, N. A., 1951.—Some Notes on *Cassinia*. Vict. Nat., LXVIII, No. 4, 69-70.

Wakefield, N. A., 1951.—New Species of *Pomaderris*. Vict. Nat., LXVIII, No. 8, 140-143.

Wakefield, N. A., 1953.—Two New Species of *Lepidosperma*. Vict. Nat., LXX, No. 4, 75-78.

Wakefield, N. A., 1955.—Flora of Victoria: New Species and Other Additions—1. Vict. Nat., LXXII, No. 2, 22-27.

Wheeler, H. M., 1935.—Studies in *Nicotiana*. A Taxonomic Survey of the Australasian Species. Univ. Calif. Publ. Bot., XVIII, No. 4, 45-68.

Williamson, H. B., 1920.—A Revision of the Genus *Pultenaea*. Pt. i. Proc. Roy. Soc. Vict., XXXII, 210-224.

Williamson, H. B., 1921.—A Revision of the Genus *Pultenaea*. Pt. ii. Proc. Roy. Soc. Vict., XXXIII, 133-148.

Williamson, H. B., 1922.—A Revision of the Genus *Pultenaea*. Pt. iii. Proc. Roy. Soc. Vict., XXXV, 97-107.

Williamson, H. B., 1925.—A Revision of the Genus *Pultenaea*. Pt. iv. Proc. Roy. Soc. Vict., XXXVII, 125-129.

Williamson, H. B., 1928.—A Revision of the Genus *Pultenaea*. Pt. v. Proc. Roy. Soc. Vict., XL, 57-61.

Willis, J. H., 1950.—Notes on Some Australian Compositae. Proc. Roy. Soc. Queensl., LXII, 101-108.

Willis, J. H., 1955.—The Australian Anchor Plant (*Discaria pubescens*) etc. Vict. Nat., LXXII, No. 4, 51-55.

Wilson, P. G., 1960.—A Consideration of the Species Previously Included Within *Helipterum albicans* (A. Cunn.) DC. Trans. Roy. Soc. S. Austral., LXXXIII, 163-177.

Wimmer, F. E., 1953.—Companulaceae—Lobelioideae. Das Pflanzenreich, Heft 107. Berlin.

Yuncker, T. G., 1932.—The Genus *Cuscuta*. Mem. Torr. Bot. Club, XVIII, No. 2, 113-329.

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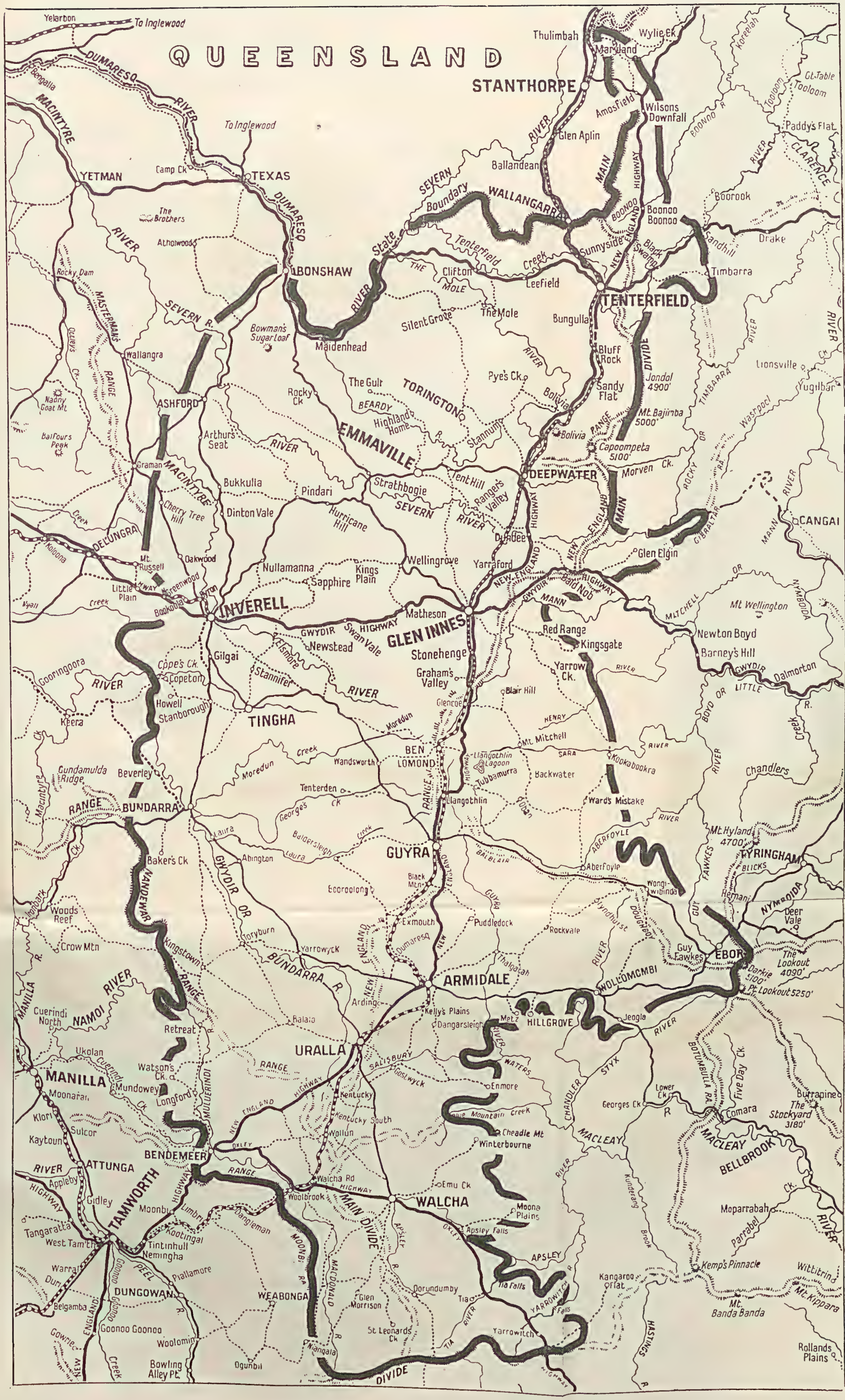
NATIONAL HERBARIUM
South Yarra
VICTORIA

FIG. 1.



QUEENSLAND
Yelarbon
To Inglewood
DUMARESQ RIVER
Bengalla
MACINTYRE RIVER
To Inglewood
YETMAN
Camp Ck
TEXAS
The Brothers
Atholwood
Rocky Dam
MASTERMAN'S RANGE
SEVERN R.
BONSHAW
Bowman's Sugar Loaf
Maidenhead
Wallangra
ASHFORD
Nadny Goat Mt
Balfours Peak
Arthurs Seat
Graman
MACINTYRE
Cherry Tree Hill
Bukkulla
Dinton Vale
DELUNGRA
Koloona
Mt. Russell
Oakwood
Little Plain
Greenwood
Bookoola
Nyall
Creek
Byron
INVERELL
Thulimbah
Maryland
Wylie Ck
STANTHORPE
Amosfield
Wilsons Downfall
Glen Aplin
Ballandean
SEVERN RIVER
State Boundary
WALLANGARRA
MAIN
HIGHWAY
BOONOO
NEW ENGLAND
Boonoo Boonoo
Sunnyside
Black Swamp
Tenterfield Creek
THE MOLE
Clifton
Leefield
TENTERFIELD
Silent Grove
The Mole
Bungulla
Bluff Rock
Sandy Flat
DIVIDE
Jondol 4900'
Mt. Bajimba 5000'
Capoompeta 5100'
RANGE
Bolivia
Pye's Ck
The Gulf
TORINGTON
BEARDY
Highland Home
Rocky Ck
EMMAVILLE
Stannum
RIVER
Pindari
Strathbogie
SEVERN RIVER
Tent Hill
Rangers Valley
DEEPWATER
Morven Ck.
Hurricane Hill
Dundee
Nullamanna
Sapphire
Kings Plain
Wellingrove
Yarraford
Glen Elgin
Bald Nob
NEW ENGLAND HIGHWAY
GLEN INNES
Matheson
GWYDIR HIGHWAY
Swan Vale
Newstead
Elsmore
Stonehenge
Graham's Valley
Stannifer
Gilgai
Cope's Ck.
Copeton
Gooringoora
RIVER
Keera
Howell
Stanborough
TINGHA
Glencoe
Moredun
BEN LOMOND
Wandsworth
Moredun Creek
Gundamulda Ridge
Beverley
Macintyre
RANGE
BUNDARRA
Tenterden
Georges Ck
Llangothlin Lagoon
Tubbamurra
Llangothlin
Balgersleigh Creek
Laura
Abington
GUYRA
Black Mtn
Ecoroolong
Baker's Ck
GWYDIR OR BUNDARRA R.
NANDEWAR RANGE
Woods Reef
Crow Mtn
Torryburn
Yarrowyck
Exmouth
Dumaresq
Puddledock
ARMIDALE
Arding
Kelly's Plains
Dangarsleigh
Balala
Kingstown
NAMOI RIVER
Cuerindi North
MANILLA
Retreat
URALLA
SALISBURY
Gostwyck
RANGE
Ukolan
Cuerindi
Watson's Ck.
Mundowey
Longford
Moonbah
Klori
Kaytoun
Sulcor
ATTUNGA
RIVER
Appleby
Gidley
Kentucky
Kentucky South
Wollun
BENDEMEER
OXLEY RANGE
Walcha Rd
HIGHWAY
Woolbrook
MAIN DIVIDE
WALCHA
Emu Ck
TAMWORTH
Moonbi
Limbri
Kootingal
Tangaratta
West Tam'th
Tintinhull
Nemingha
Dangleman
MOONBI RA
Warrai
Duri
Piallamore
DUNGOWAN
PEEL
Belgamba
Goonoo Goonoo
Woolomin
Bowling Alley Pt.
Gowrie
NEW ENGLAND
Creek
WEABONGA
MACDONALD R
APSLEY R.
Glen Morrison
St Leonards Ck
Ogunbil
Niangala
DIVIDE
Oorundumby
Tia
Tia Falls
Apsley Falls
APSLEY
YARROWITCH R
Falls
Yarrowitch
TIA RIVER
HIGHWAY
Moona Plains
Winterbourne
Cheadle Mt
Blue Mountain Creek
Enmore
WATERS
Metz
HILLGROVE
Jeogla
WOLLOMOMBI
RIVER
Red Range
Kingsgate
Yarrow Ck.
Blair Hill
HENRY
Mt. Mitchell
SARA RIVER
Kookabookra
Backwater
Wards Mistake
ABERFOYLE RIVER
Aberfoyle
Wongwibinda
Rockvale
Lyndhurst
RIVER
Guy Fawkes
EBOR
Darkie 5100'
Pt. Lookout 5250'
The Lookout 4090'
Deer Vale
NYMBOIDA
TYRINGHAM
Blicks
Remand
Mt Hyland 4700'
GUY FAWKES RIVER
Chandlers
BOYD OR LITTLE RIVER
Creek
R.
Dalmorton
GWYDIR
Barney's Hill
Newton Boyd
Mt. Wellington
NYMBOIDA OR
MITCHELL
MANN RIVER
CANGAI
GIBRALTAR RA
ROCKY OR TIMBARRA RIVER
Wasrpool
Yugilbar
Lionsville
Ck
RIVER
Timbarra
Sandhill
Drake
Boorook
CLARENCE RIVER
Paddys Flat
Tooloom
Gt Table Tooloom
Koreelah
BOONOO R
STYX
CHANDLER
MACLEAY
Georges Ck
Lower Ck
R
Comara
BOTUMBULLA RA.
Five Day Ck
Burrapine
The Stockyard 3180'
MACLEAY
BELLBROOK
Moparrabah
Ck.
RIVER
Parrabel
Kunderang Brook
Kemp's Pinnacle
Wittitrina
Mt. Kippara
Mt. Banda Banda
Kangaroo Flat
HASTINGS R
Rollands Plains

Contributions to the Taxonomy of Australian Grasses. II

JOYCE W. VICKERY

Hemarthria uncinata *R.Br.* var. **spathacea** (*Domin*) n. comb.

BASIONYM: *Rottboellia compressa* L.f. var. *spathacea* Domin in Biblioth. Bot. XX, Heft 85 (1915) 261 (figured p. 262).

HOLOTYPE: " In frutice apud Sunny Bank procul opp. Brisbane, K. Domin, XII 1909 ". This specimen is in the herbarium of K. Domin at the National Museum, Prague, and was seen by me at Kew in 1948 while it was on loan to that Herbarium.

Ancistrachne maidenii (*A. A. Hamilton*) n. comb.

BASIONYM: *Eriochloa maidenii* A. A. Hamilton in Proc. Linn. Soc. N.S.W. XXXVII for 1912 (1913) 709.

HOLOTYPE: N.S.W.: Hawkesbury River, A. A. Hamilton, 3.5.1912 (NSW 52514).

The generic affinities of this small and apparently rare grass, known only from the Hawkesbury River district in New South Wales, have long been problematical. When describing the species Hamilton apparently failed to notice the lower glume which on some spikelets is greatly reduced or abortive but on others may be up to one-quarter of a millimetre in length. As was noted by Hamilton, the species entirely lacks the callus-like base of the spikelet which is characteristic of the genus *Eriochloa;* it also differs in habit.

I have placed it in the small genus *Ancistrachne* (with 2 hitherto known species, one in the Philippine Islands and one, *Ancistrachne uncinulata* (R. Br.) S. T. Blake, in Australia) on the following characters: (*a*) Similarity of habit, though *A. maidenii* is a smaller and more slender grass than *A. uncinulata*, and similar ciliate ligule. (*b*) Upper glume and lower lemma beset with tubercle-based hairs. In *A. maidenii* these hairs are fine and very frequently curved, whereas in *A. uncinulata* they are more rigid and hooked at the tip. (*c*) Similar glabrous fertile floret with narrow hyaline margins. In *A. maidenii* the floret has a more distinctly developed but short mucro. (*d*) Small, few-flowered racemes.

A. maidenii differs from the description of the genus *Ancistrachne* S. T. Blake in the absence of a palea in the lower sterile floret, the fewer nerves in the upper glume and sterile lemma, and in the hairs on these organs not being prominently hooked at the tip. In my opinion, however, these should be regarded as specific rather than generic characters and the generic concept enlarged to contain *A. maidenii.*

In habit *A. maidenii* also somewhat resembles *Entolasia*, which differs in having densely pubescent fertile florets, and *Cleistochloa* and *Dimorphochloa*, which differ in having dimorphic spikelets. The hyaline margins of the fertile floret distinguish *A. maidenii* from most other genera of the tribe Paniceae. While the genus *Digitaria* has this feature, it differs in habit, in having membranous ligules and in various other characteristics.

Digitaria diffusa n. sp.

Holotype: New South Wales: Upper Colo, J. Vickery, 3.1950 (NSW 11017).

Gramen perenne, gracillimum, decumbens, ad nodos ramosum et radicans surculis turgidis squamulis pubescente-villosis. Culmi pluri-nodi internodis brevibus, geniculato-ascendentes ca. 10-40 cm., gracillimi, teretes vel levissime compressi, laeves. Nodi sparse pilosi vel glabri. Vaginae strictae, quam internodos breviores, saepe 2-5 cm. longae, pilis ad bases tuberculatis sparse pilosae vel glabrae, striatae. Ligula membranacea, 1-2 mm. longa, truncata vel erosa. Laminae planae, tenues, lineares vel linearo-lanceolatae, acutae, 1·5-8 cm. longae, 0·75-3 mm. latae, sparse pubescentes vel glabrae, nervis mediis tenuis albescentibusque vel obscuris, marginibus saepe tenuiter undulatis. Panicula tenuiter pedunculata, exserta, rhachide communi ca. 3-5 cm. longi racemos 2-7 graciles subfiliformes ferenti. Racemi tandem late patentes vel inferior reflexus, 1- vel 2-nati, 3-7 cm. longi, rhachide triquetro angustissime alato sursum flexuoso, spiculis aliquanto remotis binatis vel interdum ad basem apicemque 1-natis, pedicello longiore spicula aequanti, altero bis breviore. Spiculae 1·5-1·75 mm. longae, prope 0·75 mm. latae, ellipticae, acutae, virides vel purpurascentes. Gluma inferior parva, partem $\frac{1}{10}$ — $\frac{1}{4}$ spiculae aequans, obtusa vel truncata vel erosa, sine nervo. Gluma superior spiculam subaequans vel levissime brevior, levissime angustior, subacuta, 3-nervata, inter nervos et ad margines pilis brevibus tenuibus frequenter purpurascens vel raro internervis glabris. Lemma inferius spiculam aequans, acutum, firmum, 5- vel sub-7-nervatum, inter nervos exteriores vel omnes et ad margines pilis brevibus tenuibus frequenter purpurascentibus pubescens. Pili glumae superioris et lemmatis inferioris primum appressi et obscuri, tum laxe patentes et fimbriam formantes. Lemma superius ovato-ellipticum, breviter apiculatum apice raro protrudenti, minute punctulato-striolatum, primum pallidum, tandem fuscissimum vel nigrescens.

This species is known from many collections from the Coast and Tablelands of New South Wales and a few from the North-Western Slopes. It appears to have been confused with *D. tenuissima* (Benth.) Hughes by early workers in this State, a different species which is not known to occur in New South Wales.

D. diffusa appears to be related to *D. parviflora* (R. Br). Hughes but differs in its much smaller average size, decumbent habit with the stems rooting at the nodes, shorter leaves, fewer racemes, and the prescence of hairs on the spikelets which are ultimately softly spreading and fringing. The spikelets of *D. parviflora* are either glabrous or sparsely and shortly pubescent with appressed hairs on the internerves. Henrard (Monog. Gen. *Digitaria*, 1950) distinguishes *D. patula* (Hornemann) Henrard from *D. parviflora*, but after examining the Type Specimen of *D. patula* (kindly sent on loan from the Botanical Museum of the University, Copenhagen) I feel satisfied that it falls within the normal limits of the *D. parviflora* population. Henrard considers *D. striata* (R. Br.) Hughes to be conspecific with *D. patula*. I have examined the Isotype of *D. striata* (kindly sent on loan from the Herbarium, Royal Botanic Gardens, Kew) which has been matched with the Holotype at the British Museum of Natural History by W. D. Clayton. It is a very slender, erect plant without any indication of a creeping habit, the upper glume and sterile lemma are finely pubescent on the internerves, the lower glume is short and nerveless and there are only 3 panicle branches; all of these characters may, however, be found in a proportion of the collections of *D. parviflora* at the National Herbarium of New South Wales and. although perhaps a rather extremely depauperate plant, I would regard it as conspecific with *D. parviflora*. It has seemed necessary therefore to describe the population now named as *D. diffusa* as a distinct species.

Typhonium brownii Schott and Some Allied Species

OBED D. EVANS

In the course of preparatory investigations of the family Araceae for the Flora of New South Wales, it was found that there are two species of *Typhonium* in this State. These have been examined in the living as well as the dried condition. It was then found necessary to compare them with allied species in Queensland. The results of the study are given below.

1. Sterile terminal appendage of the spadix more or less conical in shape, obliquely truncate at the base, 2-5 cm. long .... *T. brownii* 1.

1.* Terminal appendage cylindrical-subulate or terete, not dilated or truncate at the base, 5-15 cm. long.

  2. Spathe 2-5 cm. wide. Terminal appendage of the spadix 1·5-3 mm. diam. Lateral lobes of the lamina of the leaf 0·5-4 cm. wide and diverging at right angles from the middle lobe .... *T. eliosurum* 2.

  2.* Spathe up to 10 cm. wide. Terminal appendage up to 4 mm. diam. Lateral lobes of the lamina of the leaf 2-5 mm. wide and usually diverging at an acute angle from the middle lobe .... *T. angustilobum* 3.

1. **T. brownii** *Schott*, Aroid. I (1855) 11, t. 15; Prodr. Syst. Aroid. (1860) 107; F.Muell., Fragm. Phytogr. Austral. VIII (1874) 187; Bot. Mag. CI (1875) t. 6180; Benth., Fl. Austr. VII (1878) 155; Engl. in A. & C. DC., Monogr. Phanerog. II (1879) 613; J. H. Maiden, Usef. Pl. Austr. (1889) 66; Moore & Betche, Handb. Fl. N.S.W. (1893) 428; Domin in Bibl. Bot. XX, Heft 85^{I} (1915) 504; F.M.Bail., Qld. Fl. V (1902) 1694; Maiden & Betche, Census (1916) 36; Engler in Pflanzenr. IV, 23F (1920) 116.

Erect glabrous herb, 20-25 cm. high. Leaves hastate, 3-lobed to 3-partite; lobes narrow- to broad-lanceolate, 5-20 cm. long, 0·5-10 cm. broad, the small veins between the primary lateral veins reticulate; petioles slender, 10-70 cm. long. Inflorescences axillary in origin, several sometimes produced in the season from the one rhizome. Peduncles 5-15 cm. long. Spathe ovoid at the base, lamina broadly ovate, acuminate, 5-15 cm. long, deep purple inside and greenish outside. Female zone at the base of the spadix 1-2 cm. long; neuter organs filiform, decurved, dark purplish. Terminal appendage of the spadix more or less conical, 2-5 cm. long, 4-15 mm. in maximum diameter, obliquely truncate at the base, almost black in colour, fleshy and finally putrescent. Flowering September-April. See Plate I, fig. 2a, 2b.

SPECIMENS EXAMINED: QUEENSLAND: Cook District: Tumoulin, Harte 4.1913 (BRI 019379); Kamerunga, Cowley (BRI 019370). Port Curtis District: Rockhampton, Bailey (BRI 019378). Burnett District: Mount Perry, Keys (BRI 019376). Moreton District: Flinders Peak, Everist 8.3.1959 (BRI 015657, 015658, 015659); Tambourine Mt., Geismann 1.1916 (BRI 019380); Simmonds, 11.1916 (BRI 019381); Stockyard Creek, National Park, White 1.1919 (BRI 019373); National Park, White 1.1919 (BRI 019374); Macpherson Range, White 1.1919 (NSW 18947); Hartmann (BRI 019377). NEW SOUTH WALES: Murwillumbah, Campbell 12.1912 (NSW 18939); Tweed R. district, Harrison 2.1902 (NSW 18955); Bonalbo Estate, Fleuston 3.1918 (NSW 18948); Tunstall via Lismore, 4.1911 (NSW 18944); Lismore, Rothwell 12.1906 (NSW 18946); Lismore, Bäuerlen 4.1891 (NSW 18945); Alstonville district, Tomlins before 1917 (NSW 18942); Sandilands Range, W of Casino, Steetz 2.1918 (NSW 18949); Deepdene, Hillgrove, Teacher of Public School 2.1912 (NSW 18940); Bowraville, Churchill 3.1954 (NSW 26694); Eastern Dorrigo, Floyd 1.1960 (49061); Nambucca R., Mathieson 2.1909 (NSW 18952); Walcha district, Campbell 12.1898 (NSW 18956); George's Creek, 40-45 miles NW of Kempsey, Boorman 1.1907 (NSW 18954; BRI 019375); Hastings R., before 1890 (NSW 18957): Warne's

Creek, E of Yarrowitch, Borger 2.1960 (NSW 49068); Wilson R., Borger 2.1960 (NSW 49070); Port Macquarie, Boorman 3.1898 (NSW 18916); The Comboyne, Chisholm 12.1924 (NSW 18959); Ellenborough Falls, Borger 2.1960 (NSW 49069); Coneac District, ca. 15 miles NW of Gloucester, Vickery 2.1937 (NSW 18938); Glendon, Hunter R., Leichhardt 1843 (NSW 18936); Capertee Valley, Gallagher 3.1913 (NSW 18937); Capertee Valley, Barnes 1.1912 (NSW 18953).

Two further specimens: Spring Vale, Port Darwin, N.T., Giles (BRI 019367); King's Sound, W.A., Froggat 1888 (NSW 18934) may belong to this species but are in poor condition. They have been labelled *T. angustilobum* but the spadix is missing in the former whilst the latter has a truncate appendage to the spadix. Good collections of *Typhonium* from the Northern Territory and North-Western Australia are desirable.

Robert Brown, Prodr. (1810) 336, mistakenly refers this species to *Arum orixense* Roxb., which is an Asiatic species.

2. **T. eliosurum** (*F. Muell. ex Benth.*) *O. D. Evans*, stat. nov.

BASIONYM: *T. brownii* Schott var. *eliosurum* F. Muell. ex Benth., Fl. Austr. VII (1878) 155.

TYPIFICATION: New South Wales, vicinity of Manly Beach, C. Wilhelmi 11.1863 in Herb. Kew, drawing seen, HOLOTYPE. There is an ISOTYPE in the National Herbarium, Melbourne, which is in very poor condition.

Herba erecta, 20-30 cm. alta. Folia hastata, triloba vel tripartita, lobis linearibus lato-lanceolatisve 5-20 cm. longis, petiolis gracilibus 10-40 cm. longis. Pedunculi 5-15 cm. longi. Spatha basi ovoidea, lamina lanceolata vel angusto-lanceolata, apice acuminata et saepe attenuata 10-20 cm. longa, plerumque intus atropurpurea extus viridescens. Zona foeminea basi spadicis circiter 1 cm. longa; zona neutralis 2-3 cm. longa organis neutralibus filiformibus 2-10 mm. longis; zona mascula 1-2 cm. longa; appendix terminalis teres, 7-15 cm. longus, 2-4 mm. diam., fuscus, basi dilatatus et cum spadice continuus.

Erect glabrous herb, 20-30 cm. high. Leaves hastate, 3-lobed to 3-partite; lobes linear to broad-lanceolate, 5-20 cm. long; petioles slender, 10-40 cm. long. Peduncles 5-15 cm. long. Spathe ovoid at the base; lamina lanceolate to narrow-lanceolate, the apex acuminate and often attenuated, 10-20 cm. long, usually deep purplish inside and greenish outside. Female zone at the base of the spadix ca. 1 cm. long; neuter zone 2-3 cm. long; neuter organs filiform, 2-10 mm. long; male zone 1-2 cm. long; terminal appendage terete, 7-15 cm. long, 2-4 mm. diam., dark in colour, the base not much thicker than the upper portion of the spadix. Flowering season Oct.-Dec. See Plate I, fig. 1a, 1b, 1c.

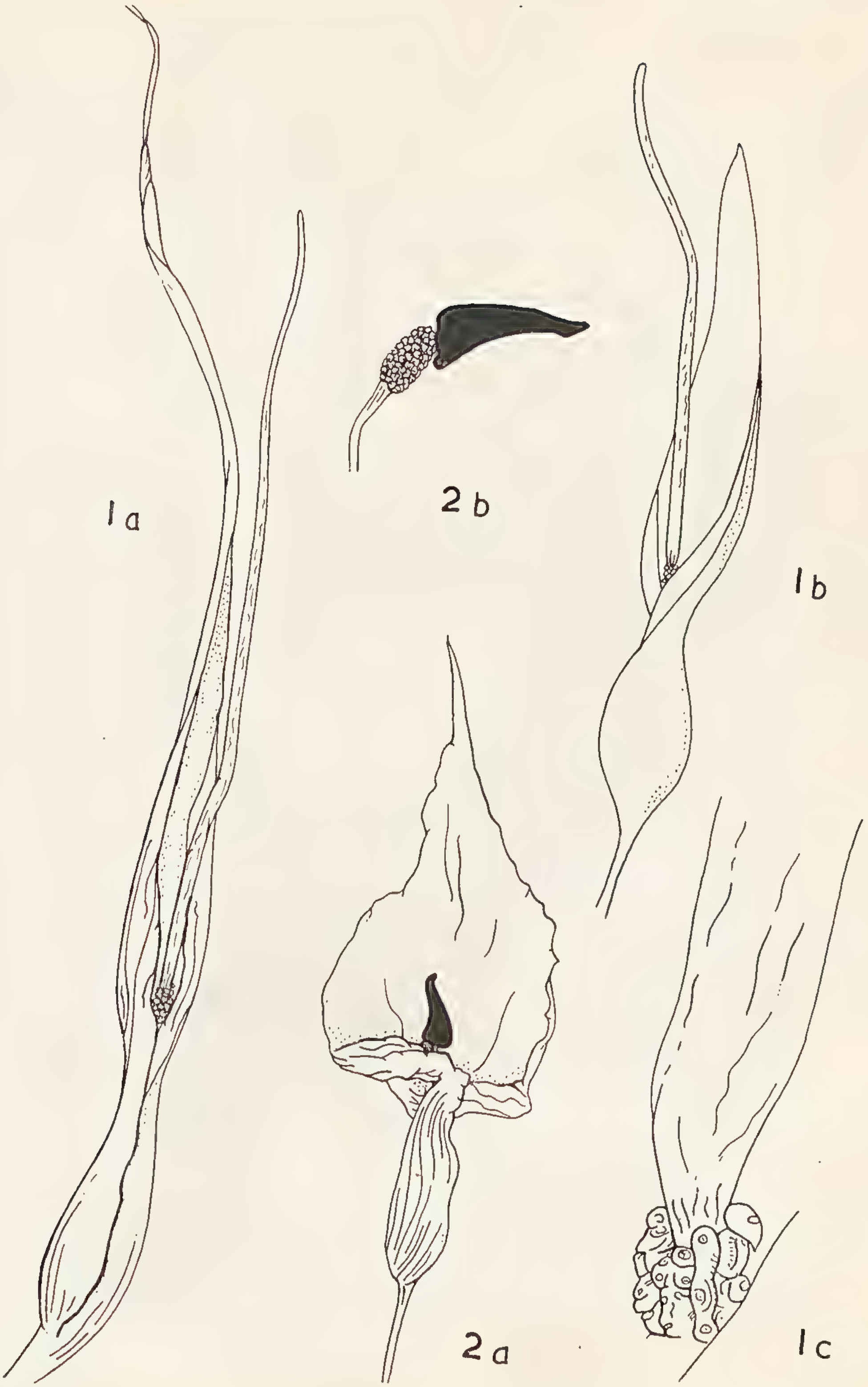
SPECIMENS EXAMINED: New South Wales: Bulladelah, Rupp 11.1923 (NSW 18958); Crawford R., Cheel 10.1902 (NSW 18950); Wyong Creek, Betche 10.1893 (NSW 18943); Patonga Creek, Blakely & Shiress 12.1924 (NSW 18941); near Manly Beach, Wilhelmi 11.1863 (MEL); Stanwell Park, Hamilton 10.1910 (NSW 18951); Mt. Coolangatta, 5 miles NE of Nowra, Constable 12.1960 (NSW 54003); Currumbene Creek, 6½ miles S of Nowra, Constable 12.1960 (NSW 54002).

In addition to the above, the following specimen, in leaf only, probably belongs to this species: Mathie's Creek, 6 miles W of Wandandian, Floyd 8.1952 (NSW 20286).

There appears to be no intergradation between this species and *T. brownii* Schott although the southerly range of the latter to some extent overlaps that of *T. eliosurum*. The two species cannot be separated on vegetative material alone. This species bears some resemblance in the base of the appendage to *T. angustilobum* F.Muell. but it differs in that the appendage and the spathe are narrow; differences appear also in the characters of the lamina of the leaf.

Plate I

M. D. Tindale del



1. *Typhonium eliosurum* (F. Muell. ex Benth.) O. D. Evans. (*a*) Inflorescence (NSW 49027) x $\frac{2}{3}$. (*b*) Inflorescence, Holotype (after R. Melville) x $\frac{2}{3}$. (*c*) Base of appendage of spadix, also showing part of male zone, Holotype (after R. Melville) x 6.

2. *Typhonium brownii* Schott. (*a*) Inflorescence (NSW 18939) x $\frac{2}{3}$. (*b*) Upper portion of spadix showing sterile appendage and male zone (NSW 49068) x $\frac{2}{3}$.

3. **T. angustilobum** *F.Muell.*, Fragm. Phytogr. Austral. X (1876) 66; Benth., Fl. Austr. VII (1878) 155; F.M.Bail., Qld. Fl. V (1902) 1695.

Erect glabrous herb. Leaves 3-partite with long linear segments, the central one 0·3-1 cm. wide, ca. 15-25 cm. long, the laterals 0·3-0·5 cm. wide and diverging more or less at an acute angle from the central segment. Spathe ovate, acuminate, up to 10 cm. broad. Terminal sterile appendage of the spadix cylindrical, ca. 5-10 cm. long, up to 4 mm. diam., not truncate at the base.

SPECIMENS EXAMINED: Queensland: Cook District, Gilbert R., White No. 1455, 2.1922 (BRI 019369); Mount Molloy, Carr. 3.1938 (BRI 019366).

T. millarii F.M.Bail., Bot. Bull. 2 (" *Millari* "); F.M. Bail., Qld. Fl. V (1902) 1695 is probably related to *T. brownii*, according to Bailey's description. He gives the following points of difference: prominently striated petioles, the sheathing bases being widely spread over; venation of the leaf segments very oblique and not half so numerous; much larger and quite scentless flowers.

An incomplete specimen of *T. millarii* has been seen.

ACKNOWLEDGEMENTS.

The writer desires to thank the Directors of the Botanic Museum and Herbarium, Brisbane and of the National Herbarium, Royal Botanic Gardens, Melbourne for the loan of material. Thanks are also due to Dr. R. Melville, Royal Botanic Gardens, Kew, for kind assistance with information and drawings. Mention must also be made of the valuable assistance given by my colleagues on the staff of the National Herbarium, Royal Botanic Gardens, Sydney, particularly Mr. L. A. S. Johnson, who supervised the work generally and also prepared the latin description, and Miss Mary D. Tindale who very kindly prepared the figures. A note of thanks is also due to the Official Collector, Mr. E. F. Constable, for painstaking searches for living material.

Studies in Australian Pteridophytes. No. 3

Mary D. Tindale

Due to the forthcoming publication of the first part of the " Pteridophyta of South Eastern Australia ", (Contrib. N.S.W. Nat. Herb. Fl. Ser. Nos. 208-211), it has been necessary to publish the following new combinations, species and notes on the fern flora of that region.

Arthropteris prorepens *Domin*

The identity of *Arthropteris proprepens* Domin in Bibl. Bot. LXXXV (1913) 64, has been a matter of conjecture for a long time. The holotype which was collected by Domin at Bellenden-Ker, North-eastern Queensland in December 1909, was obtained on loan by courtesy of the Botanical Department, the National Museum, Prague. This holotype is a good match for the young fronds of *Teratophyllum brightiae* (F. Muell.) Holttum, especially NSW P7902 collected in the Cairns district, North-eastern Queensland by Watts in July 1913.

Grammitis armstrongii *Tindale* sp. nov.

G. billardieri affinis sed plantis confertioribus. Rhizoma late repens, ramosum, paleis ochroleucis vel pallide ferrugineis, tenuibus, non clathratis, non peltatis, margine subintegris vel potius sinuatis et pilis paucis obtusis ornatis, apice acuminatis vel obtusis vestitum. Lamina coriacea vel herbacea, oblanceolata, angustissime oblanceolata vel spathulata, 0·7-1·8 cm. longa, 2-5 mm. lata, apice late rotundata vel obtusa, margine integra vel inaequaliter sinuata, basi in stipite sensim attenuata, costa glabra vel pilis paucis et simplicibus rare vestita. Venae liberae, simplices vel furcatae. Sori in massa rotundata subtus mox confluentes, partem superiorem frondium occupantes. Sporangia prope globosa, glabra, annulis ex 8-12 cellulis incrassatis, pedicellis praeter apicem 1 cellula latis. Sporae globosae vel tetrahedro-globosae, flavo-virides vel brunneo-virides, dense et inaequaliter granulatae, 48·75-56·25 μ x 37·5-56·25 μ.

Related to *G. billardieri* but with more compact plants. *Rhizome* widely creeping, branched, clothed with scales which are buff or light ferruginous, thin, non-clathrate, non-peltate, the margin subentire or rather sinuous and bearing a few, obtuse hairs, the apex acuminate or obtuse. *Lamina* coriaceous or herbaceous, oblanceolate, very narrowly oblanceolate or spathulate, 0·7-1·8 cm. long, 2-5 mm. broad, the apex broadly rounded or obtuse, the margin entire or irregularly sinuate, gradually narrowing into the stipe, the costa glabrous or rarely clothed with a few simple hairs. *Veins* free, simple or forked. *Sori* soon confluent into a rounded mass on the lower surface, occupying the upper portion of the fronds. *Sporangia* almost globose, glabrous, the annulus with 8-12 indurated cells, the pedicel 1 cell broad except at the apex. *Spores* globose or tetrahedral-globose, yellowish-green or brownish-green, densely and irregularly granulated, 48·75-56·25 μ x 37·5-56·25 μ.

Holotype: Thredbo River Gorge, Kosciusko, Australia, 5,200 ft. alt., on overhanging rocks, very localized, granite, Johnson & Constable 1.1951 (NSW P3086), located in the National Herbarium of New South Wales, Sydney, Australia. Isotype (US).

Distribution: New Zealand (North and South Islands), Stewart, Macquarie and Kerguelen Islands and Australia (Southern Alps of New South Wales and Victoria as well as the mountains of Tasmania).

EQUIVALENT SYNONYMS: *Grammitis pumila* Armstr. in N.Z. Inst. Trans. & Proc. XIII, 1880 (1881) 341, non Swartz (1806); Dobbie & Crookes, New Zealand Ferns (1952?) 373. HOLOTYPE? Craigieburn Range, New Zealand, J. B. Armstrong 1867 (Canterbury Museum, Christchurch, New Zealand, examined). *Polypodium billardieri* (Willd.) C. Chr. var. *pumilum* (Armstr.) Cheesem., Man. N.Z. Fl. (1906) 1010.

The habitat of *Grammitis pumila* was cited by Armstrong, l.c. 341, as " Canterbury and Otago Provincial Districts, first collected by J. F. Armstrong in 1865 at 3-6,000 ft. alt." but the specimen sent to Sydney as the type was obtained by J. B. Armstrong two years later in the Craigieburn Range.

Unfortunately as *G. pumila* Armstr. is a later homonym, the description of a new species was necessary. Due to the uncertainty about the holotype of *G. pumila* Armstr., I have based my new species on a different type specimen.

G. armstrongii is found in matted patches on rocks at high altitudes between 4,000 and 7,000 ft. in the mountains of New Zealand, the Southern Alps of Victoria and New South Wales as well as in the mountain ranges of Tasmania but on the Subantarctic Islands this species is found at much lower altitudes.

G. armstrongii is very closely allied to *G. billardieri* but the latter is characterized by a tufted or shortly creeping rhizome, also the sori are in an oblique, seldom confluent row on each side of the midrib and the spores are much smaller being 20 to 40 μ x 20 to 37·5 μ.

Arachniodes *Blume*

Arachniodes Blume, Enum. Pl. Jav. (1828) 241-2.

SYNONYM: *Byrsopteris* Morton in Amer. Fern Journ. L (1960) 149.

Terrestrial ferns. *Rhizome* short and suberect, shortly or widely creeping, clothed with scales which are fibrillose, non-peltate, non-clathrate, entire or with teeth formed by 2 adjacent cells. *Stipes* erect, not articulated to the rhizome, with 3 or more vascular bundles, clothed throughout or at the base with brown or red-brown scales. *Main rhachis* without gemmiferous scaly buds, the ridges of the upper surface never continuous with the leaf-margin, the channel glabrous or clothed with scales. *Lamina* decompound, broadly deltoid or pentagonal, herbaceous to coriaceous, basiscopically produced in some species, anadromous, often glossy, with or without stiff marginal teeth, glandular hairs absent or sparse. *Costae* grooved on the adaxial surface, the raised basiscopic edges of the channel continuous with those of the rhachises and broken to receive them, the lamina decurrent along the margins of the rhachis. *Pinnules* not jointed to the rhachis, usually unequally-sided at the base, the basal acroscopic pinnule or lobe of the middle pinnae much closer to the main rhachis than the corresponding basal basiscopic pinnule or lobe. *Veins* free, anadromous, not reaching the margin. *Indusium* orbicular-reniform, attached by a deep sinus, rarely interspersed with a few peltate indusia. *Sori* orbicular, dorsal or subterminal on the veinlets. *Paraphyses* absent. *Sporangia* with an annulus including 12 to 16 indurated cells, the pedicel long and narrow. *Spores* bilateral, monolete, with a perispore.

GENOTYPE: *Arachniodes aspidioides* Bl., Java. At the Rijksherbarium, Leiden, Holland, in 1951 I examined the type of *Arachniodes aspidioides* Bl., Enum. Pl., (1828) 242, collected at the summit of Baerangrang in Java (Herb. Lugd. Bat. No. 908,311 . . . . . . 998). The segments of the lamina are more obtuse than in Australian specimens of *Arachniodes aristata* (Forst. f.) Tindale **comb. nov.** (basionym *Polypodium aristatum* Forst. f., Prodr. (1786) 82). I wish to thank Prof. R. E. Holttum and Prof. Lam and his staff for re-examining the type of *A. aspidioides* for me.

This is a genus of about 50 species most of which occur in the China-Himalayan region of Asia, although several species are also found in Polynesia, Africa, America and one species extends to Australia. R. C. Ching published a monograph of *Rumohra* in Sinensia V (1934) 23-91, in which he united *Rumohra adiantiformis* (Forst. f.) Ching with *Arachniodes aristata* and its allies. In Ferns of Malaya, Holttum has indicated that *R. adiantiformis* has much closer affinities with *Davallia* and for that reason he removed the dryopteroid ferns (namely *A. aristata* and its allies) from *Rumohra* and transferred them to *Polystichopsis* which he raised to generic rank without stating the place and date of publication of the basionym. *R. adiantiformis* is characterized by a davallioid main rhachis instead of the dryopteroid type as in *Arachniodes*. In *R. adiantiformis* the indusia are orbicular-peltate, whereas in *A. aristata* and its allies they are reniform-orbicular, although peltate indusia are found occasionally in fronds of *A. aristata* and *Arachniodes amabilis* (Bl.) Tindale **comb. nov.** (basionym *Aspidium amabile* Blume, Enum. Pl. Jav. (1828) 165).

In Amer. Fern Journ. L (1960) 145-155, Morton published a paper entitled " Observations on Cultivated Ferns VI. The Ferns Currently Known as *Rumohra* ". He described a new genus *Byrsopteris* (with *Polypodium aristatum* Forst. f. as the genotype), pointing out that Holttum should not have chosen *Polystichopsis* to replace *Rumohra* for the group of *R. aristata*. However Morton unfortunately overlooked the genus *Arachniodes* which was described by Blume in Enum. Pl. Jav. (1828) 241-2, but it must replace *Byrsopteris*. The question of *Polystichopsis* will be fully discussed in Contrib. N.S.W. Nat. Herb. Fl. Ser. Nos. 208-211.

Lastreopsis smithiana *Tindale* sp. nov.

Rhizoma ascendens, obliquum vel erectum, 2-4 cm. crassum, paleis linearibus, angusto-lanceolatis vel lanceolatis, persistentibus, atrobrunneis, marginem versus pallide brunneis, usque ad 7 mm. longis et usque ad 1 mm. latis, margine pilis numerosis, longis, deflexis, glanduloso-capitatis dense vestitis, apice acuminatis dense ornatum. Stipes 10-55 cm. longus, 0·5-4 mm. latus, erectus vel suberectus, ochroleucus, pallide brunneus vel roseo-brunneus, basin versus atrobrunneus, subtus nitidus et glabratus, supra apicem versus *Ctenitis*-pilis 2-cellulis vestitus, paleis basis stipitis ut in rhizomate. Rhachis anguste alata, ochroleuca, pallide straminea vel roseo-brunnea, subtus levis et glabra vel subglabra, latissime sed non profunde canaliculata, marginibus pinnularum ultimarum ut duabus lineis elevatis in rhachidibus et rhachillis superne decurrentibus, sulco *Ctenitis*-pilis 2-cellulis articulatis dense vestito. Lamina 25-50 cm. longa, 12-45 cm. lata, tripinnatifido-pinnata vel quadripinnata, quinquangularis, praeter basin versus anadromica, herbacea, atroviridis, subtus pallidior, apice acuminata, saepe decurvata. Pinnae primariae infimae maximae, oblique lato-ovatae vel angusto-lanceolatae, basiscopice auctae, 4-28 cm. longae, 3-22 cm. latae, 10-25-jugae, apice acuminatae et serratae. Pinnae secundariae in jugis inferioribus in pedicellis brevibus et anguste alatis, sine pinnulis basiscopicis sessilibus plerumque ad rhachidem adnatis, apice spinuloso-dentatae, basi decurrentes, basiscopice auctae, infimae 7-8 cm. longae, 2-5 cm. latae, 12-15-jugae. Segmentae ultimae in pedicellis alatis, approximatae, alternatae, oblongo-falcatae vel oblongo-rhomboideae, margine crassae et spinuloso-dentatae, apice late rotundatae. Venae subtus praesertim prominentes, liberae, venulae minores simplices vel furcatae, in segmentis ultimis anadromicis. Costae et costulae *Ctenitis*-pilis 2-cellulis supra vestitae, subtus glabrae vel pilis 3-5-cellulis et paucis sparse ornatae. Venulae minores omnes glabrae vel subtus pilis 3-5-cellulis et paucis sparse vestitae. Sori rotundati, mediales, 0·8-2 mm. lati, ad venulas mediales vel supra furcam vel ad furcam venularum positi. Indusium rotundato-reniforme, persistens, purpurellum, pallide brunneum vel brunneum, medio saepe fuscum, margine integrum vel fere integrum, rarissime pilis glandulosis ornatum, sine pilis acicularibus. Sporangia numerosa, cellulis induratis annuli 12-14; pedicellus longus, pilo glanduloso, oblongo, aurantiaco ornatus. Sporae bilaterales, globoso-ellipsoidales vel interdum globosae, perisporiis pallide flavis vel pallide brunneis, cristis convolutis ornatae, 28·13-35·63μ x 26·25-30μ, ala 3·75-5·63μ lata. Pili glandulosi oblongi, appressi, aurantiaci, unicellulares, in venis rhachidibusque sparse vestiti.

Rhizome ascending, oblique or erect, 2-4 cm. broad, densely clothed with scales which are linear, narrowly lanceolate or lanceolate, persistent, dark brown, pale brown towards the margin, up to 7 mm. long and up to 1 mm. broad, the margin densely clothed with numerous, long, deflexed, glandular-headed hairs, the apex acuminate. *Stipes* 10-55 cm. long, 0·5-4 mm. broad, erect or suberect, fawn, light brown or pinkish-brown, dark brown towards the base, glossy and glabrous below, clothed above towards the apex with 2-celled *Ctenitis*-hairs, the scales of the base of the stipes the same as on the rhizome. *Rhachis* narrowly winged, fawn, light stramineous or pinkish-brown, smooth and glabrous or subglabrous on the lower surface, very broadly and very shallowly channelled, the margins of the ultimate pinnules decurrent on the upper surface as 2 ridges on the main and other rhachises, the channel densely clothed with 2-celled, articulated *Ctenitis*-hairs. *Lamina* 25-50 cm. long, 12-45 cm. broad, 3-pinnatifid-pinnate or 4-pinnate, quinquangular, anadromous except towards the base, herbaceous, dark green, paler on the lower surface, the apex acuminate, often decurved. *Lowest primary pinnae* the largest, obliquely broadly ovate or narrowly lanceolate, basiscopically enlarged, 4-28 cm. long, 3-22 cm. broad, 10- to 25-jugate, the apex acuminate and serrate. *Secondary pinnae* in the lower pairs with short and narrowly winged pedicels, without sessile basiscopic pinnules mostly adnate to the rhachis, the apex spinuloso-dentate, the base decurrent, basiscopically produced, the lowest 7-8 cm. long, 2-5 cm. broad, 12- to 15-jugate. *Ultimate segments* with winged pedicels, closely spaced, alternate, oblong-falcate or oblong-rhomboidal, the margin thickened and spinuloso-dentate, the apex broadly rounded. *Veins* prominent expecially on the lower surface, free, the minor veinlets simple or forked, anadromous in the ultimate segments. *Costae* and costules clothed with 2-celled *Ctenitis*-hairs on the upper surface, glabrous beneath or sparsely clothed with a few, 3- to 5-celled hairs. *Minor veinlets* all glabrous or clothed below with a few, 3- to 5-celled hairs. *Sori* orbicular, medial, 0·8-2 mm. broad, borne on the middle of the veinlets or above or at the fork of the veinlets. *Indusium* orbicular-reniform, persistent, purplish, light brown or brown, often dark in the centre, the margin entire or almost so, very rarely clothed with glandular hairs, without acicular hairs. *Sporangia* numerous, with 12-14 indurated cells in the annulus; the pedicel long, bearing a glandular, oblong, orange hair. *Spores* bilateral, globose-ellipsoidal or sometimes globose, with light yellow or light brown perispores bearing convoluted crests, 28·13-35·63 μ x 26·25-30 μ, the wing 3·75-5·63 μ broad. *Glandular hairs* oblong, appressed, orange, unicellular, sparsely clothing the veins and rhachises.

HOLOTYPE: about 1 mile NW of Mt. Glorious, South-eastern Queensland, growing almost in a creek at the bottom of a rainforest gully, L. S. Smith and M. Tindale, 1.8.1956 (NSW P7429), located in the National Herbarium, Sydney, Australia. ISOTYPE (K).

DISTRIBUTION: Australia (Mountain ranges of South-eastern Queensland and the McPherson Range on the Queensland-New South Wales border).

This species is named in honour of Mrs. D. A. Smith for her interest in the ferns of Queensland.

Lastreopsis smithiana is very closely allied to *L. shepherdii* (Kze. ex Mett.) Tindale which ranges from South-eastern Queensland to Tasmania and South Australia. As in *L. shepherdii* the rhizome is tufted and the ultimate segments of the lamina are spinulose-dentate but the apices of the primary pinnae are less serrated than in *L. shepherdii.* In both species the indusia lack acicular hairs and, except in a recently collected specimen of *L. smithiana* from Mt. Hobwee, Queensland, S. T. Blake 20608, there are no glandular hairs on the indusia. However the fronds of *L. smithiana* are 3-pinnate-pinnatifid to 4-pinnate, whereas those of *L. shepherdii* are 2- to 3-pinnate. Another closely related species is *L. microsora* (Endl.) Tindale which also has spinulose-dentate ultimate segments of the lamina. The latter is often 3-pinnate-pinnatifid to 4-pinnate but the rhizome is narrow and long-creeping. *L. microsora* has a wide range from North-eastern Queensland to Gippsland, Victoria, as well as extending to New Zealand, whereas *L. smithiana* has a restricted distribution.

Taxonomic Notes on Australian Plants

L. A. S. JOHNSON

These notes deal with a number of taxonomic matters requiring attention in groups in which full revisions are either not necessary or not at present feasible.

PROTEACEAE

Darlingia *F. Muell.*

Darlingia darlingiana (*F. Muell.*) *L. Johnson*, **comb. nov.**

Helicia darlingiana F. Muell., Fragm. Phytogr. Austral. V, Fasc. xxxi (Apr. 1865) 24 (BASIONYM).

Darlingia spectatissima F. Muell., l. c. Fasc. xxxvi (Feb. 1866) 152, nom. illegit. (superfl.).

D. ferruginea *J. F. Bail.* in Queensl. Agric. Journ. V (1899) 402.

D. spectatissima var. *ferruginea* (J. F. Bail.) C. T. White in Journ. Arn. Arb. XI (1930) 231.

This species, which was somewhat hesitantly proposed by Bailey, appears to be clearly distinct in field and morphological characters, though closely related to *D. darlingiana*.

Hakea *Schrad.*

Hakea divaricata *L. Johnson*, **nom. nov.**

H. intermedia Ewart et Davies in Ewart, Fl. N. Terr. (1917) 85, nom. illegit. (BASIONYM), non *H. intermedia* Hook. in Hook. Ic. Pl. V (1842) sub t. 437.

Hakea pulvinifera *L. Johnson*, **sp. nov.**

HOLOTYPE: Near Keepit Dam, N.S.W., J. B. Heywood 9.10.1950 (NSW 54043), flowering.

Arbuscula usque ad 4 m. alta habitu interdum aliquanto diffuso, trunco ramisque majoribus cortice suberoso corrugatoque, ramulis novellis sparse sericeo-puberulis mox glabrescentibus. Folia teretia subtus interdum levissime sulcata, novella parce pubescentia pilis appressis tandem glabrata, plerumque aliquanto irregulariter ternatim ad biternatim et divaricatim divisa sed interdum infima ramuli simplicia, 4-12 cm. longa, 1·5-2·0 mm. diametro, basi aliquanto decurrenti cicatricem primo circiter 3 mm. longam 1·5 mm. latam facienti, apice pungenti recto sphacelato brunnescentique. Inflorescentiae axillares pseudoracemosae aliquando nonnullae paniculatim in rhachide communi axillari disposita; pseudoracemi 5-8 cm. longi, suberecti, multiflori, rhachide robustiuscula pubescenti pares florum in pulvinis prominentibus ferenti. Pedicelli 8-10 mm. longi, patentes, pubescentes. Torus valde oblique elongatus. Perianthium adaxialiter curvatum, totum evolutum 9-12 mm. longum, tubo versus basin obliquum aliquanto dilatato, limbo globoso, tepalis luteo-albis extus praesertim in limbo sericeo-pubescentibus intus glabris; glandula nectarifera elongata, plus minusve irregulariter lobata, stipitem ovarii partim amplectens; antherae circiter 1·0-1·2 mm. longae; ovarium in stipite circiter 2 mm. longo, minutissime et sparsiuscule puberulum pilis perbrevibus, stylo incurvo interdum post anthesin aliquanto torto circiter 1·8 cm. longo sparse pilosiusculo pilis brevibus sed eis ovarii longioribus, disco peristigmatico obliquo et conico-pyramidali 1·3-1·5 mm. longo basi circiter 1 mm. diametro. Fructus ignotus. Floret Oct.-Nov.

Distribution: Known only from near the Keepit Dam, on the Namoi River, between Gunnedah and Manilla, North-west Slopes of New South Wales.

Specimens Examined: ½ mile below Keepit Dam Site, Namoi R., R. G. Pacholke 7.11.1949 (NSW 54042); near Keepit Dam, J. B. Heywood 9.10.1950 (NSW 54043).

According to Mr. J. B. Heywood the trees were seen only in one patch of several acres, on a hard rocky hillside on a steep slope. He found no fruits in two years' observation.

H. pulvinifera belongs to Sect. *Grevilleoides* Benth. and is closely related to *H. ivoryi* F. M. Bail. of far North-western New South Wales and South-western Queensland and to *H. divaricata* L. Johnson (*H. intermedia* Ewart et Davies, non Hook.) of Central Australia. Geographically it is well isolated from both of these species and no intermediates are expected to be found. The new species differs from *H. ivoryi* in its thicker leaves (ca. 1 mm. diam. in *H. ivoryi*), longer pedicels (5-7 mm. in *H. ivoryi*) and thicker inflorescence rhachis with prominently pulvinate points of insertion of the flowers. From *H. divaricata* it differs in the much longer, conical-pyramidal peristigmatic cone, the pubescent young branchlets, the absence of glandular hairs on the inflorescence and the pulvinate rhachis. *H. ednieana* Tate, of South Australia, has much shorter, more slender leaves and much smaller flowers. Collections of *H. pulvinifera* with fruits and search for further populations are much to be desired.

Hakea constablei *L. Johnson*, **sp. nov.**

Holotype: Bowen's Creek, Bilpin-Mt. Irvine road, 1,750 feet, N.S.W., E. F. Constable 6.10.1950 (NSW 16415), flowering.

Frutex ramosus usque ad 6-7 m. altus sed saepe humilior, ramis vetustioribus aliquando pendentibus, ramulis novellis sericeo-pubescentibus tandem glabrescentibus. Folia teretia sine sulco, integra, 4-12 cm. longa, 1·0-1·3 mm. diametro, versus basin aliquantulum attenuata apice attenuata pungentiaque, recta vel saepe arcuata, novella sericea sed mox glabrata. Inflorescentiae axillares vel in ramulis axillaribus perbrevibus (1-3 mm.) determinatis aliquanto lignosis 1-3-natim gestae, fasciculiformes circiter 6-8-flora, rhachide 2-3 mm. longa, pubescenti, bracteis squamiformibus, pubescentibus, caducis. Pedicelli graciles, 5-8 mm. longi, sericeo-pubescentes. Perianthium album, non evolutum 4-5 mm. longum, totum evolutum 6-7 mm. longum, versus limbum involutum, novellum pilis albis perpaucis instructum sed mox glabratum; glandula nectarifera parva, crescentiformis; antherae 0·5-0·6 mm. longae; ovarium subsessile, glabrum; stylus curvatus circiter 10 mm. longus disco terminali oblique expanso cono persistigmatico late conico. Folliculus in pedicello brevi crassoque (ca. 1 cm. longo, 0·7-1·0 cm. crasso), novellus subcylindricus pruinosus, maturus crasse et oblique ellipsoideus, 4·5-5 cm. longus, 3-3·5 cm. crassus; valvae apice oblique subacutae, cornu dorsale parvum acutum prope apicem ferentes, arcte verrucosae verrucis rotundatis vel interdum rugoso-verrucosae.

Distribution: Scattered localities in the Blue Mountains, New South Wales, from about 500 m. to 1,100 m. altitude.

Specimens Examined: Bowen's Creek, Bilpin, 1,650 feet, E. F. Constable 23.3.1950 (NSW 11295); Bowen's Creek, Bilpin-Mt. Irvine road, E. F. Constable 6.10.1950 (NSW 16415); Bowen's Creek, Bilpin-Mt. Irvine road, E. F. Constable 27.9.1958 (NSW 54028); Mt. Wilson, J. H. Maiden 10.1899 (NSW 54032); Mt. Wilson, per J. Foster 10.1926 (NSW 54031); Du Faur's Rocks, Mt. Wilson, C. K. Ingram 23.8.1952 (NSW 54033), 3.4.1953 (NSW 54030); Du Faur's Rocks, Mt. Wilson, 3,100 ft., L. A. S. Johnson 10.8.1953 (NSW 54034); Du Faur's Rocks, Mt. Wilson, E. J. Gregson 9.1953 (NSW 54029); 1½ miles S of Bell, L. A. S. Johnson & H. T. Clifford 24.8.1952 (NSW 20279, MEL); Katoomba, E. C. Chisholm 1.1923 (NSW 54035).

H. constablei falls in Section *Hakea*, Series *Glabriflorae* Benth. It is closely related to *H. propinqua* A. Cunn., but is clearly distinguished by the larger flowers which are about twice the size of those of *H. propinqua*, and by the more massive fruit which has more crowded but much less acute, warty protuberances. It is particularly clearly distinguished from the Blue Mountains populations of *H. propinqua* since the latter have short leaves (2-5 cm.), small fruits (3-4 cm. long) and yellow flowers. A small stand of *H. constablei* occurs at Du Faur's Rocks, Mt. Wilson, adjacent to *H. propinqua* and the contrast is quite striking in the field. There are no known hybrids or intermediates. Unlike the common and widespread *H. propinqua*, *H. constablei* is a very rare species. Only single plants were found at the Bowen's Creek and Bell localities and a small uniform population at Du Faur's Rocks. It has not been rediscovered at Katoomba. No obvious ecological reason for its restriction is apparent. It can scarcely be of hybrid origin since there exists no possible combination of parents for it. It has been grown from seed, showing no departure from the wild plants.

The species is named in honour of Mr. E. F. Constable, Seed and Plant Collector at the New South Wales National Herbarium, who first drew attention to it in 1950. The earlier collections had been referred to *H. propinqua*.

Grevillea *R.Br. ex Knight corr. R.Br.*

Grevillea diminuta *L. Johnson*, **sp. nov.**

HOLOTYPE: Brindabella Range near Mt. Franklin, alt. ca. 1,500 m., Australian Capital Territory, R. D. Hoogland No. 6279, 11.11.1956 (NSW 54037). There are ISOTYPES in CANB, MEL, BRI, K, L, A, BM, US and G. Flowering.

Frutex diffusus usque ad 50 cm. altus, late patens, ramulis dense sericeo-pubescentibus. Folia breviter (1-2 mm.) petiolata, elliptica, 0·6-2·0 cm. longa, 0·3-0·8 cm. lata, apice minute mucronulata, supra laevia mox glabrataque sed punctulis depressis minutis numerosis instructa, nitenter viridia, subtus argenteo-sericea pilis appressis, costa media supra vix prominula, infra prominenti; venis lateralibus obscuris. Pseudoracemi ramulos foliiferos breves vel interdum elongatos terminantes, plus minusve deflexi, simplices, tota rhachide 2·5 cm. longa, parte sterili 1·0-2·5 cm. longa, florifera 1·0-2·5 cm. longa, pubescenti vel modice tomentosa. Flores arcti, binati, unusquisque in pedicello rufo-tomentoso circiter 2 mm. longo gestus; torus aliquanto obliquus; perianthium adaxialiter curvatum, totum 7-10 mm. longum, tubo versus basin sensim dilatato sub limbo angustato, limbo (in alabastro) globoso circiter 2 mm. diametro, tepalis tandem separantibus, extus ferrugineo-pubescentibus vel tomentosis, intus prope medium barbatis caeteroquin glabris; glandula nectarifera crescentiformis; antherae circiter 1 mm. longae; ovarium glabrum, breviter stipitatum stipite plus minusve glauco; stylus glaber, incurvus, 6-7 mm. longus cono peristigmatico valde dilatato. Folliculus compresso-globosus, subglaucus, laevis vel leviter striatus, circiter 1·5 cm. longus, textura tenui sed firma. Semina non visa. Floret Maj.—Nov.

DISTRIBUTION: Southern end of the Brindabella Range on the western border of the Australian Capital Territory and New South Wales, around 1,500 m. altitude, mostly on rocky screes, often with *Podocarpus lawrencei*.

SPECIMENS EXAMINED: Mt. Franklin road, ca. 4,500 feet, C. W. E. Moore No. 2361, 17.2.1953 (NSW 54040, CANB); roadway on Mt. Franklin, ca. 5,200 feet, J. H. Willis 18.6.1948 (NSW 9176, MEL); Brindabella Range near Mt. Franklin, ca. 1,500 m., R. D. Hoogland No. 6279, 11.11.1956 (NSW 54037, CANB), 3 miles beyond Mt. Franklin Chalet, M. Gray No. 4357, 28.10.1957 (NSW 54038, CANB); Mt. Ginini, ca. 5,000 feet C. W. E. Moore No. 2508, 30.4.1953 (NSW 54036, CANB); Mt. Gingera, ca. 5,500 feet, C. W. E. Moore No. 2516, 30.4.1953 (NSW 54039, CANB); F.C.T., C. E. Carter 10.1938 (NSW 9177).

This subalpine species has been well known in the Mt. Franklin area for some years. It falls within the Section *Lissostylis* which is at present under revision, but is described separately here for the convenience of botanists in the Australian Capital Territory. *G. diminuta* is clearly related to *G. victoriae* F. Muell., but differs from all races of that polymorphic species in its much smaller flowers. In fruit the much shorter persistent styles (less than 1 cm.) distinguish it from *G. victoriae* (ca. 2 cm.). Most forms of *G. victoriae*, of course, have much larger leaves than *G. diminuta* but in the var. *leptoneura* Benth. (including *G. brevifolia* F. Muell. ex Benth.) from the borders of New South Wales and Victoria (Delegate to east of the Upper Genoa River) and the Omeo district of Victoria, the leaves may be almost as small and as obscurely veined as those of *G. diminuta*. However, these plants all have the normal large flowers (perianth 1·7-2·0 cm. long) of *G. victoriae* and are connected by intergrading forms with other races of that species. In the case of *G. diminuta* there are no intergrading forms. One of the races of *G. victoriae* is also found on the Brindabella Range but the plants grow in forested gullies and so far as is known the populations of the two species are not in contact. These plants have been referred to *G. miqueliana* F. Muell. but this is incorrect. True *G. miqueliana* has two disjunct areas with somewhat differing populations; the Type area is south of the Main Divide in eastern Victoria, the other is in the upper Tuross River district in the South Coast ranges of New South Wales. It differs from all races of the closely related *G. victoriae* in the minutely papillose-scabrous leaves and the loose and spreading indumentum of the flowers.

I am indebted to Mr. Max Gray for field information on *G. diminuta*. Mr. J. H. Willis, of the National Herbarium, Melbourne, who had considered describing this species, under another name, kindly sent me material and some notes on learning that I was revising the section *Lissostylis*.

MONIMIACEAE

Wilkiea *DC.*

Wilkiea austroqueenslandica *Domin* in Bibl. Bot. XXII, Heft 89^{II} (1925) 672.

Through the kindness of the Director of the National Museum, Prague, I have examined the HOLOTYPE of this species: In hygrodrymiomontis Tambourine Mt., Queensland, K. Domin No. 4047, 3.1910 (PR), fruiting.

This is a common small tree or shrub in rainforest in the Tweed River-Richmond River district of New South Wales and in South Queensland but has not been mentioned in Queensland literature and has been misidentified in New South Wales with *Tetrasynandra pubescens* (Benth.) Perk. and *T. longipes* (Benth.) Perk., for instance by Maiden and Betche, Census N.S.W. Pl. (1916) 80. These two species are North Queensland plants, quite different from *W. austroqueenslandica*, though neither in fact belongs to the genus *Tetrasynandra* as typified by *T. laxiflora* Perk., but rather to *Wilkiea* and perhaps *Kibara* respectively. It is understood that they are under study at the Queensland Herbarium (BRI). Whether the generic separation of *Wilkiea* from *Kibara* is in fact justified is doubtful, but it is maintained for the present.

In New South Wales the species *Wilkiea huegeliana* (Tul.) A.DC. has not been recognised, but this is quite distinct from *W. macrophylla* (A. Cunn.) DC. and is in fact far more common and widespread. Most material formerly referred in this State to *W. macrophylla* is actually *W. huegeliana*. The three subtropical species of *Wilkiea*, which have been investigated in the field as well as in the herbarium may be distinguished as follows:

1. Flowers and inflorescence silky-pubescent, male flowers 4-5 mm. diam. with all 4 perianth-lobes duplicated inside; stamens ca. 30; female flowers 5-7 mm. diam. Leaves rather thinly coriaceous, ultimate fine reticulation not prominent, 10-16 pairs of main primary lateral veins. Far S. Queensland and Tweed R.-Richmond R., N.S.W. .... *W. austroqueenslandica.*

1.* Flowers and inflorescence almost or quite glabrous, male flowers 2-3 mm. diam. with only the outer pair of perianth-lobes doubled inside; stamens ca. 8; female flowers 3-4 mm. diam. Leaves coriaceous with prominent reticulation, 5-8 pairs of main lateral veins.

   2. Plant entirely glabrous, including the carpels and female receptacle. Finest ultimate reticulation usually rather obscure. Petioles mostly 0·3-0·6 cm. long, rarely to 1·0 cm. Fruiting receptacles 0·3-0·8 cm. broad, carpels ca. 15. S. Queensland to Richmond R., N.S.W. .... *W. macrophylla.*

   2.* At least the carpels and female receptacle, and often the leaves, pilose or pubescent. Finest ultimate reticulation always prominent. Petioles usually 0·6-1·1 cm. long, but shorter on small-leaved plants. Fruiting receptacles 0·7-1·2 cm. broad, carpels 20-30. (N.? &) S. Queensland to S. Coast of N.S.W. .... *W. huegeliana.*

CRUCIFERAE

Several Australian species formerly referred to *Cardamine* were correctly removed by Schulz from this genus and transferred to *Nasturtium* s. lat. However, the correct name for the latter in the broad sense, or for the major part if *Nasturtium* s. str. is separated, is *Rorippa* Scop. Several new combinations are necessary.

Rorippa *Scop.*

Rorippa dictyosperma (*Hook.*) *L. Johnson*, **comb. nov.**

Cardamine dictyosperma Hook., Journ. Bot. I (1834) 246 (Basionym).

Nasturtium dictyospermum (Hook.) O. E. Schulz in Engl. Bot. Jahrb. LXVI (1933) 36.

R. eustylis (*F. Muell.*) *L. Johnson*, **comb. nov.**

Cardamine eustylis F. Muell. in Trans. Vict. Inst. I (1854) 114 (Basionym).

Nasturtium eustyle Benth. ex Kuntze, Rev. Gen. Pl. I (1891) 21, in synon., nom. invalid.

Also *Nasturtium conspicuiflorum* Domin (in Bibl. Bot. XXII, Heft 89II (1925) 690) may be conspecific but needs critical examination.

R. laciniata (*F. Muell.*) *L. Johnson*, **comb. nov.**

Cardamine laciniata F. Muell. in Trans. Phil. Soc. Vict. I (1854) 34. (Basionym.)

Nasturtim laciniatum (F. Muell.) O. E. Schulz in Engl. Bot. Jahrb. LXVI (1933) 36.

R. stylosa (*DC.*) *H. Allan*, Fl. New Zealand I (1961) 188.

Cardamine stylosa DC., Syst. Veg. II (1821) 248. (Basionym.)

Nasturtium stylosum (DC.) O. E. Schulz in Engl. Pflanzenr., Crucif.-Sisymbr. (1924) 147.

There are in New South Wales at least two undescribed species of *Rorippa* related to these, but they require further study, and are much more restricted in distribution than those named above.

PAPILIONACEAE

Genista monspessulana (*L.*) *L. Johnson*, **comb. nov.**

Cytisus monspessulanus L., Sp. Pl. (1753) 740 (BASIONYM).

Genista candicans L., Cent. I (1755) 22.

Cytisus candicans (L.) Lam., Fl. Fr. II (1778) 623.

This species is naturalised in parts of New South Wales, Victoria, Tasmania and South Australia. The requisite combination under *Genista* has not hitherto been made. Rothmaler (1944) has stated, correctly in my view, that the section *Teline* of *Cytisus* s. lat., to which this species belongs, should be referred to the genus *Genista*.

SAPINDACEAE

Cupaniopsis parvifolia (*F. M. Bail.*) *L. Johnson*, **stat. nov.**

Cupania anacardioides A. Gray var. *parvifolia* F. M. Bail., Queensl. Fl. I (1899) 290 (BASIONYM).

Cupaniopsis anacardioides (A. Gray) Radlk. var. *parvifolia* (F. M. Bail.) Domin in Bibl. Bot. XXII, Heft 89IV (1927) 904.

This is distinct in the field and herbarium from *C. anacardioides* s. str. I have seen the two species growing side by side on the lower Richmond River, and remaining quite distinct. There are no intermediates in the extensive collections in herb. NSW. *C. parvifolia* differs from *C. anacardioides* not only in the consistently smaller leaflets with closer and finer venation, but also in the consistently shorter inflorescence and smaller fruits, and is usually a taller tree. It is a tree of better developed rainforest than *C. anacardioides*, usually away from the sea-coast, whereas the latter species is chiefly found in low, poorly developed rainforest or hind-dune vine thicket, near the sea or estuaries. The range of *C. parvifolia* extends from the Gympie district of Queensland south to Gloucester, New South Wales. *C. anacardioides*, on the other hand, extends from the Northern Territory coasts to Port Hacking, south of Sydney, and exhibits no apparent differences over this great distance.

MYRTACEAE

Syzygium *Gaertn.*

For some years it has been a source of inconvenience and confusion that many Australian species of *Syzygium* have had no published combinations under that generic name, and reference has had to be made to them under *Eugenia*. It seems desirable to publish the necessary new combinations for the extratropical species, at least. The following list includes all the subtropical species currently recognised in *Syzygium*, including those for which combinations already exist.

Syzygium coolminianum (*C. Moore*) *L. Johnson*, **comb. nov.**

Eugenia coolminiana C. Moore in C. Moore et Betche, Handb. Fl. N.S.W. (1893) 207 (BASIONYM); C. T. White in Proc. Roy. Soc. Queensl. LVII (1947) 24 (issued separately 1946).

E. cyanocarpa F. Muell. ex Maiden et Betche in Proc. Linn. Soc. N.S.W. XXIX (1905) 740; F. Muell., Fragm. Phytogr. Austral. IX (1875) 146, nom. provisorium (" varietas aut species ").

From an examination of all the material in the New South Wales National Herbarium and study of the populations in northern New South Wales I am satisfied that these names apply to a single species. The type of *E. coolminiana* represented the short-leaved maritime form, whereas *E. cyanocarpa* was described from the "normal" larger-leaved form.

S. corynanthum (*F. Muell.*) *L. Johnson*, **comb. nov.**

Eugenia corynantha F. Muell., Fragm. Phytogr. Austral. IX (1875) 144 (BASIONYM).

S. crebrinerve (*C. T. White*) *L. Johnson*, **comb. nov.**

Eugenia crebrinervis C. T. White in Proc. Roy. Soc. Queensl. LVII (1947) 25 (issued separately 1946) (BASIONYM).

S. floribundum *F. Muell.*, Fragm. Phytogr. Austral. IV (1864) 58.

Eugenia ventenatii Benth., Fl. Austral. III (1867) 283.

MISAPPLIED NAME: "*Metrosideros floribunda*" sensu Vent., Jard. Malm. II (1804) t. 75, non Sm. (1797). Non *Eugenia floribunda* West (1793).

Mueller in his synonymy explicitly excluded *Metrosideros floribunda* Sm. (which is *Angophora floribunda* (Sm.) Sweet). *S. floribundum* F. Muell. is considered as a new name dating from 1864. It would probably be best to select one of the specimens seen by Mueller as lectotype, rather than Ventenat's plate, which he also cited.

S. francisii (*F. M. Bail.*) *L. Johnson*, **comb. nov.**

Eugenia francisii (F. M. Bail. in Queensl. Agric. Journ. XXVI (1911) 315, t. 31 (BASIONYM).

E. tomlinsii Maiden et Betche in Proc. Linn. Soc. N.S.W. XXXVIII (1913) 247.

S. hodgkinsoniae (*F. Muell.*) *L. Johnson*, **comb. nov.**

Eugenia hodgkinsoniae F. Muell., Fragm. Phytogr. Austral. IX (1875) 145 (BASIONYM).

S. luehmannii (*F. Muell.*) *L. Johnson*, **comb. nov.**

Eugenia luehmannii F. Muell. in Vict. Nat. IX (1892) 10 ("*Luehmanni*") (BASIONYM).

E. parvifolia C. Moore in Proc. Roy. Soc. N.S.W. XXVII (1893) 85.

S. moorei (*F. Muell.*) *L. Johnson*, **comb. nov.**

Eugenia moorei F. Muell., Fragm. Phytogr. Austral. V (1865) 33 (BASIONYM).

S. paniculatum *Gaertn.*, Fruct. Sem. Pl. I (1788) 167, t. 33.

Eugenia myrtifolia Sims in Curtis's Bot. Mag XLVIII (1821) t. 2230, non Salisb. (1796).

E. australis Wendl. ex Link, Enum. Hort. Berol. II (1822) 28.

E. paniculata (Gaertn.) J. Britt. in Journ. Bot. XXXVII (1899) 247, nom. illegit nec Jacq. (1788), nec Lam. (1789).

E. paniculata (Gaertn.) J. Britt. ("Banks ex Gaertn.") var. *australis* (Wendl. ex Link) L. H. Bail. in Gent. Herb. II (1930) 171.

Jambosa australis (Wendl. ex Link) DC., Prodr. III (1828) 207.

J. thozetiana F. Muell., Fragm. Phytogr. Austral. I (1859) 225.

Acmena *DC.*

McVaugh (1956, p. 136) and Willis (1957, pp. 197-8) have argued that *Acmena* DC. must be typified by *Metrosideros floribunda* Sm. and therefore is a synonym of *Angophora* Cav. Willis has accordingly taken up the name *Lomastelma* Rafin. in its place. However, the International Code of Botanical Nomenclature states that the type of a generic name is a *species* (not a specific name). As Merrill and Perry (1938) have shown, the *species* from which De Candolle derived his generic concept was that now known as *Acmena smithii* (Poir.) Merr. et Perry, although he mistakenly referred this to *Metrosideros floribunda* Sm. The case is parallel to that of *Macrozamia* more fully argued in a previous paper (Johnson 1959, pp. 87-88), and if this view is followed the name *Acmena* DC. should be retained in Merrill and Perry's sense.

A. australis (*C. Moore*) *L. Johnson*, **comb. nov.**

Memecylon australe C. Moore in C. Moore et Betche, Handb. Fl. N.S.W. (1893) 208 (BASIONYM). Non *Eugenia australis* Wendl. ex Link (1822).

Eugenia brachyandra Maiden et Betche in Proc. Linn. Soc. N.S.W. XXIII (1898) 15.

Acmena brachyandra (Maiden et Betche) Merr. et Perry in Journ. Arn. Arb. XIX (1938) 17.

Maiden and Betche pointed out the identity of *Memecylon australe* C. Moore with their species but this was overlooked by Merrill and Perry. The epithet "*australis*" was, of course, preoccupied in *Eugenia* but must be used under *Acmena*.

Choricarpia *Domin*

C. subargentea (*C. T. White*) *L. Johnson*, **comb. nov.**

Syncarpia subargentea C. T. White, Queensl. Dept. Agr. Bot. Bull. No. 21 (1918) 8 (BASIONYM).

S. subargentea var. *latifolia* C. T. White, l.c.

This species clearly belongs in *Choricarpia* rather than *Syncarpia*, on grounds of general morphology as well as wood and bark anatomy (R. K. Bamber, pers. comm.). Ingle and Dadswell, in Aust. Journ. Bot. I (1953) 365, use the combination "*C. subargentea*" but it is not there validly published, being without reference to basionym. The new combination for this Queensland species is published here since it is required for use in publications on bark anatomy from the New South Wales Forestry Commission.

UMBELLIFERAE

Several new combinations are necessary in *Platysace* Bunge, and there are new taxa to be described in *Trachymene* Rudge.

Platysace *Bunge*

Platysace clelandii (*Maiden et Betche*) *L. Johnson*, **comb. nov.**

Trachymene clelandii Maiden et Betche in Proc. Linn. Soc. N.S.W. XXXVII (1912) 246 ("*Clelandi*") (BASIONYM).

Platysace xerophila (*E. Pritzel*) *L. Johnson*, **comb. nov.**

Trachymene xerophila E. Pritzel in Engl. Bot. Jahrb. XXXV (1904) 453 (Basionym).

Platysace kochii (*E. Pritzel*) *L. Johnson*, **comb. nov.**

Trachymene kochii E. Pritzel in Fedde's Rep. Spec. Nov. X (1911) 133 (Basionym).

Trachymene *Rudge*

Trachymene bivestita (*Domin*) *L. Johnson*, **comb. et stat. nov.**

Didiscus benthamii Domin var. *bivestitus* Domin in Sitzungsb. Königl. Böhm. Ges. Wiss. Prag (1908) No. 10, 40 (Basionym).

This Queensland plant seems to be sharply distinct from the Western Australian *T. anisocarpa* (Turcz.) B. L. Burtt (*D. benthamii* Domin, *nom. illegit.*). The differences are adequately given by Domin.

Trachymene ochracea *L. Johnson*, **sp. nov.**

Holotype: Waverley Downs (W of Paroo River, near Hungerford), N.S.W., J. L. Boorman 10.1912 (NSW 54006).

Herba annua (vel biennis?) habitu, caulibus et foliis *T. glaucifoliae* omnino similis sed basibus aliquando marginibusque foliorum bractearumque et partibus inferioribus pedunculorum primariorum secundariorumque ultimorumque semper pilis brevibus glandulosis instructis (ut frequenter sed non semper in *T. glaucifolia*). Inflorescentia eae *T. glaucifoliae* similis sed umbellis minoribus, circiter 1 cm. diametro; flores parvi petalis albis circiter 1 mm. longis, filamentis circiter 1 mm. longis, antheris 0·5 mm. longis, stylis 0·7-1 mm. longis, carpellis duobus evolutis. Fructus mericarpiis duobus semper evolutis; mericarpia ochracea, oblique rotundata, circiter 2-2·5 mm. longa, 1·5-2 mm. lata, papillis 20-30 arctis obtusis instructa, papillis exterioribus radialiter elongatis.

Distribution: North-west and Far North-west Plains of New South Wales, and probably adjacent parts of South-western Queensland.

Specimens Examined: New South Wales: Clifton Bore (47 miles E of Milparinka), W.A.W. de Beuzeville 5.12.1939 (NSW 54004): Wanaaring district, H. W. S. Freeman 10.1924 (NSW 54005): Waverley Downs, J. L. Boorman 10.1912 (NSW 54006); Paroo River district, E. Betche 9.1900 (NSW 54007): Toorale to Goonery, J. L. Boorman 9.1912 (NSW 54008); Barnato to Tiltagoona (W of Cobar), E. Reuss 6.1921 (NSW 54009); "Prattenville", 9 miles S of Bourke, R. D. B. Whalley 20.10.1960 (NSW 54010); Bourke district, per Glenfield Veterinary Research Station 10.1930 (NSW 54013); Cobar, Inspector of Stock 12.1905 (NSW 54011); Byrock, E. Betche 11.1890 (NSW 54012); Tarcoon, J. L. Boorman 11.1903 (NSW 54014); Western district 11.1896 (NSW 54015).

This species is closely related to *T. glaucifolia* (F. Muell.) Benth., and does not appear to differ significantly from that species in vegetative characters. All the material seen is glandular-hairy but so also are most specimens of *T. glaucifolia*. Of the 27 collections of *T. glaucifolia* in herb. NSW, from New South Wales, Queensland, the Northern Territory, South Australia and Western Australia, only three of the eight South Australian collections are glabrous, though there is some variation in the amount of indumentum. The leaves and stems of *T. ochracea* usually lack more than a trace of glaucousness, but this also applies to many individuals of *T. glaucifolia*. On the other hand, *T. ochracea* differs sharply from *T. glaucifolia* in its smaller umbels (1 cm. diam. against 2-2·5 cm.) and flowers (petals 1 mm., against 2 mm.), and smaller fruits with both mericarps regularly developed (one almost always abortive in *T. glaucifolia*) and with the protuberances larger, more obtuse, more crowded and much less numerous (over 100 in *T. glaucifolia*). There is no evidence that the flowers are ever blue in *T. ochracea*, as they sometimes are in *T. glaucifolia*.

Like *T. glaucifolia* which occurs in the same region, though extending much beyond it, *T. ochracea* is known as " Wild Parsnip " and is reputed to be poisonous to stock.

Trachymene incisa *Rudge* in Trans. Linn. Soc. X (1810) 300, t. 21.

Two geographic races can be recognised within the species:

(a) **T. incisa** ssp. **incisa.**

This comprises the eastern populations, in South-eastern Queensland, the North and Central Coast, Northern Tablelands and eastern part (Howell-Tingha) of the North-west Slopes of New South Wales. There is a certain amount of local variation within this extensive range, especially in the degree of leaf-division, but the subspecies may be recognised by the multipapillate or occasionally entirely smooth mericarps, which have a rather dull surface.

(b) **T. incisa** ssp. **corrugata** *L. Johnson*, **subsp. nov.**

HOLOTYPE: Etoo Creek, 4½ miles NE of Gwabegar, N.S.W., L. A. S. Johnson and E. F. Constable, 3.11.1954 (NSW 30878; K).

A subspecie typica mericarpiis fructuum nitidis subradialiter pluricorrugatis nec papillatis differt.

SPECIMENS EXAMINED: Eeba Creek, Pilliga, H. M. R. Rupp 10.1932 (NSW 54016); Etoo Creek, 4½ miles NE of Gwabegar, L. A. S. Johnson and E. F. Constable 3.11.1954 (NSW 30878); between Baradine and Narrabri, G. Burrow 12.1926 (NSW 54017).

This race, which occurs on sandy soils in the northern Pilliga Scrub, well to the west of ssp. *incisa*, is distinguished by the shining mericarps, the surfaces of which are raised in radially elongated corrugations rather than bearing numerous corky papillae as in the type race. No intermediates are known, but since there are no constant differences in other characters and since the Pilliga populations are clearly a western geographic representative of *T. incisa*, subspecific rank seems more appropriate than specific.

LITERATURE CITED

Johnson, L.A.S., 1959—The families of Cycads and the Zamiaceae of Australia. Proc. Linn. Soc. N.S.W., LXXXIV: 64-117.

McVaugh, R., 1956—Nomenclatural notes on Myrtaceae and related families. Taxon, V: 133-147.

Merrill, E. D. and Perry, L. M., 1938—A synopsis of *Acmena* DC., a valid genus of the *Myrtaceae*. Journ. Arn. Arb., XIX: 1-20.

Rothmaler, W., 1944—Gliederung der Gattung *Cytisus*. Rep. Spec. Nov. Reg. Veg., LIII: 137-150.

Willis, J. H., 1957—Vascular flora of Victoria and South Australia. Vict. Nat., LXXIII: 197-8.

Studies in the Taxonomy of *Eucalyptus*

L. A. S. Johnson

As a necessary preliminary to a more comprehensive treatment elsewhere, a number of matters concerning various species of *Eucalyptus* are dealt with in this paper. They include some regrettable but necessary changes in the nomenclature of well-known species. Since these are inevitable, it will be advantageous if they come into general use immediately. They result chiefly from past failure to examine carefully the type specimens of well-known names, rather than from resurrection of forgotten names. In almost all cases treated here, the species concerned have been extensively studied in the field as well as the herbarium by myself during the last decade.

E. foecunda *Schau.* in Lehm., Pl. Preiss. I (1844) 130; C. A. Gardner in Journ. Agric. W. Austral., Ser. 4, I (1960) 1075; non auct.

E. leptophylla F. Muell. ex Miq. in Ned. Kruidk. Arch. IV (1856) 123.

E. leptophylla var. *floribunda* Blakely in Trans. Roy. Soc. S. Austral. LX (1936) 155.

E. leptophylla var. *densa* Blakely, Key Euc. (1934) 222.

E. leptophylla var. *leptorrhyncha* Blakely, l.c.

I have examined an Isotype of *E. foecunda* (Freemantle, Nov. Holland. merid.-occident., G. L. Preiss 231, NSW 54050, in fruit) which certainly belongs to the same species as *E. leptophylla* F. Muell. ex Miq., and has nothing to do with the species known by Blakely (1934) and previous authors as "*E. foecunda*" (see below, *E. oraria*). Blakely himself had redetermined NSW 54050 as *E. leptophylla*, apparently overlooking the fact that it was an isotype of *E. foecunda*.

E. foecunda s. orig. is a widespread mallee in Western Australia, South Australia, Victoria and New South Wales. There is variation both in individuals and between populations but none of the varieties distinguished by Blakely represents a sufficiently consistent population for its recognition to be useful.

Gardner, as cited above, also recognised that the Fremantle plants described by Schauer do not belong to the species usually treated as *E. foecunda*, and pointed out their affinity with *E. leptophylla*. He did not, however, actually refer *E. leptophylla* to the synonymy of *E. foecunda* Schau., apparently considering that it might be distinct. After examining very copious herbarium material and studying the species in the field in both Western and Eastern Australia I am convinced that the Fremantle plants belong to the same species as the remainder, so that the name *E. foecunda* must henceforth be used for the whole. The Western Australian *E. rigidula* Maiden is very closely related to *E. foecunda* but may be treated as a distinct species, at least for the time being. It is not confined to the Comet Vale district as thought earlier, but I have collected it near New Norcia and west of Carrabin, and have seen specimens from Totadjin and Merredin. *E. foecunda* also occurs in many of these areas and there may be some interbreeding in places.

E. oraria *L. Johnson* **sp. nov.**

Holotype: About 5 miles N of Dongara, W.A., L.A.S. Johnson 10.12.1960 (NSW 54051), in fruit.

Misapplied Name: "*E. foecunda*" auct., pro parte, non Schau.

Frutex habitu " mallee ", 2-3 m. altus (vel interdum aliquanto altior?), multicaulis, caulibus gracilibus cortice laevi griseo. Cotyledones et folia juvenilia non visa. Folia adulta quasi alterna, petiolata, lanceolata vel anguste lanceolata vel interdum lineare-lanceolata, 4-8 cm. longa, 0·5-1·5 cm. lata, viridia nitentiaque, venulosa, venis lateralibus angulum circiter 50° cum costa media facientibus aliquantulum irregularibus, vena intramarginali prope marginem. Inflorescentiae axillares, cymosae umbelliformes 7- vel 11-florae, pedunculo haud vel vix compresso 7-12 mm. longo. Alabastra breviter pedicellata, clavata, circiter 6 mm. longa, operculis duobus, exteriore praemature abscisso, interiore hemisphaerico hypanthio multum breviore, hypanthio infundibuliformi vel subcylindrico. Filamenta alba, omnia fertilia; antherae versatiles, circiter 0·5 mm. longae rimis parallelis dehiscentes, glandula dorsali elongata fuscescenti. Fructus breviter pedicellati subcylindrico-piriformes circiter 6 mm. longi, 5 mm. lati, disco quasi verticaliter depresso 1·0-1·5 mm. lato, capsula inclusa 3-4-loculari valvis erectis in hypanthio inclusis.

DISTRIBUTION: West coast of Western Australia in the Murchison River and Irwin River districts, on calcareous sandy soils derived from the coastal limestone.

SPECIMENS EXAMINED: Top of limestone hills, near mouth of Murchison River, A. Oldfield (NSW 54052); 5 miles N of Dongara, L. A. S. Johnson 10.12.1960 (NSW 54051); Nouvelle Hollande, Côte Occidentale, Baudin 1801 (NSW 54053); W. Australia, J. Drummond 2nd coll. 87 (NSW 54054).

This is the species treated by Blakely (1934) under the name of *E. foecunda* Schau. The true *E. foecunda* is a quite unrelated species, treated above. *E. oraria* is a slender mallee restricted to a narrow belt of calcareous sandy soil over coastal limestone, sometimes found in association with *E. dongarraensis* Maiden. It is related to the widespread " York Gum ", *E. loxophleba* F. Muell., which was also included by Maiden and others under the name of *E. foecunda*. *E. oraria* differs from all forms of *E. loxophleba* in its less irregular leaf venation and smooth-barked " whipstick-mallee " habit. More robust mallee forms of *E. loxophleba* are found in dry areas but these do not resemble *E. oraria* in other respects. One or two of these races constitute well-marked populations with distinctive field appearance and may need to be distinguished, in due course, as subspecies.

E. glaucina (*Blakely*) *L. Johnson*, **stat. nov.**

E. tereticornis Sm. var. *glaucina* Blakely, Key Euc. (1934) 130, pro parte typica (BASIONYM)

HOLOTYPE: Williams River, N.S.W., J. L. Boorman 8.1906 (NSW 54128), buds, fruit, juvenile and adult leaves.

This is found in the Rappville district, south of Casino, and again in a number of localities in the Taree, Stroud, Dungog and Paterson districts, usually on shallow soils or stony hillsides, but not on poor sandstones. Specimens from other localities cited by Blakely belong to *E. tereticornis*, not to *E. glaucina*.

E. glaucina is very distinct in the field from *E. tereticornis*, which often occurs nearby on more favourable sites. It differs not only in the strongly pruinose branchlets and buds and glaucous foliage (these are found at times in forms of *E. tereticornis*) but also in the usually angular branchlets even in flowering shoots, the stouter peduncles and pedicels, more marked " calyx rim " (outer operculum scar) in bud, and more conical less acuminate operculum than is usual in *E. tereticornis* in the same regions.

The Red Gum group, like the Stringybarks, consists of many closely related, often hybridising species. *E. glaucina*, considered on a population basis, is as distinct as most of the species in the group.

E. rodwayi *R. T. Bak. et H. G. Sm.*, Pap. Proc. Roy. Soc. Tas. (1912) 191 & pl.

LECTOTYPE: Interlaken, Tasmania, L. G. Irby 28.5.1912 (NSW 54113), buds, fruits, juvenile and adult foliage.

This has been known in Tasmania as "*E. aggregata*" but it is separable from the true *E. aggregata* Deane et Maiden of New South Wales by the intramarginal vein being much closer to the margin, especially in fully adult leaves, and in general by the larger fruits, larger buds and coarser leaves. There is also a marked difference in essential oils (H. S. McKern, private communication); although this is not in itself of great taxonomic significance, since markedly different oils can occur in what is undoubtedly a single species, it is useful as a confirmatory character. I have had no difficulty in separating any of the extensive collections of the two species in herb. NSW.

E. aggregata does not occur in Victoria, so there is a considerable gap between the two groups of populations. It would be possible to treat *E. rodwayi* as a subspecies but since there is no morphological overlap or intergradation specific rank is more convenient. The populations are effectively isolated and differ consistently. It seems probable that *E. yarraensis* Maiden et Cambage is a relic of a former occurrence of *E. aggregata* in Victoria, now persisting only in hybrid form with *E. ovata* Labill. The specimens strongly suggest this but I have not yet been able to examine the small occurrence in the field.

E. mannifera *Mudie* in Trans. Med.-Bot. Soc. Lond. III (1834) 24, s. orig., non auct.

E. maculosa R. T. Bak. in Proc. Linn. Soc. N.S.W. XXIV (1900) 598.

E. lactea R. T. Bak. in Proc. Linn. Soc. N.S.W. XXV (1901) 691, t. 46. f. 5., pro parte lectotypica.

E. praecox Maiden in Proc. Roy. Soc. N.S.W. XLVIII (1914) 423.

E. gullickii R. T. Bak. et H. G. Sm., Res. Euc. Ess. Oils, ed. 2 (1920) 128.

E. mannifera var. *elliptica* Blakely et McKie in Blakely, Key Euc. (1934) 148.

This is the species generally known by its later synonym *E. maculosa*. The name *E. mannifera* has been greatly confused in application. Maiden (Crit. Rev. Gen. Euc. III (1916) 113) treated it as a synonym of *E. rubida* Deane et Maiden, despite its priority over that name. Blakely (Key Euc. (1934) 148) applied it to a mixed concept including the following: (a) *E. dalrympleana*, northern race (see below), (b) *E. mannifera* s. orig. (*E. maculosa* R. T. Bak.), northern race, (c) hybrids of *E. rubida* with various other species. He also included material of (b) under var. *elliptica*. He did not recognise the occurrence of *E. dalrympleana* or of *E. maculosa* in the Northern Tablelands division of New South Wales at all, and although he treated the northern race of the latter under *E. mannifera* he did not include material from the type locality of *E. mannifera* under this name.

The typification of *E. mannifera* Mudie is certain (see Plate II), but because of the past confusion it is desirable to quote *in extenso* the following observations on the matter kindly made for me by Dr. R. D. Melville, of the Royal Botanic Gardens Kew:

" The specimen found in the type cover consists of a single rather depauperate branchlet with one galled inflorescence, one fully developed bud on a peduncle which had borne 2 or possibly 3, 2 very young peduncles with apparently small flower buds and one inflorescence bud still in its calyptra. The label reads: ' Eucalyptus mannifera A. Cunn. E. mannifera Moudie Walp. Rep. II 163 Bathurst 91/1824 N.S.Wales A. Cunningham '. There is an additional printed label indicating its origin: ' Allan Cunningham's Australian Herbarium. Presented by Robert Heward Esq. 1862 '.

" It is apparently on the evidence of this label that Maiden (Crit. Revision 3, 112) states that ' Allan Cunningham's observations were made on herbarium specimens collected at Bathurst, N.S.W. (now in Herb. Kew) '. Reference to the Cunningham ms at Kew (Kew Collectors VI. 81) revealed a copy of the diagnosis and notes quoted by Maiden with the date added ' Jany. 1825 '. In the margin was the note: ' A specimen of the manna will be found in the tin box of seeds etc.'. These facts together indicate a different sheet as the type specimen. It bears a good branching spray (a) with numerous mature flower buds plus a small branchlet, (b) bearing buds in similar condition. Pinned on this sheet is a piece of paper bearing the whole of the diagnosis and notes quoted by Maiden, closely written on both sides in Allan Cunningham's small neat hand. Also pinned on is a small packet that evidently contained the sample of manna referred to in Kew ms. Most of the inscription on this has been defaced by black stain produced by decomposition of the manna. The sheet also bears a discordant element in the form of a small branchlet (c) with flower buds, clearly from a different plant. In the opposite corner by the side of the Cunningham label is a label which reads: Eucalyptus virgata Manna Gum Merulan, Argyle. N.S.W.'. The diagnosis *E. viminalis* has been added in ink and the collector's name ' Backhouse ' in pencil, apparently by Bentham. A pencilled ' + ' connects this label with the spray C, which is similarly marked. This is the Backhouse specimen cited by Bentham Fl. Austral. 3, 240. This (type) sheet belongs to Herb. Hooker.

" A third sheet bearing a good spray in similar condition to that on the type came from Herb. Bentham. It appears to be a piece of the original Cunningham collection presented by Hooker to Bentham since the label has printed on it ' New Holland. A. Cunningham. Hooker, 1835 ' with the written words ' Eucalyptus Manna Moreton Bay '.

" The mention of Moreton Bay here throws doubt on the place of origin of the type specimen. The description in Cunningham ms. occurs under the heading: ' Reference to specimens of plants collected in the district called Illawarra or Five Islands, Port Macq*re*, Moreton Bay, Bathurst and various parts of the Colony of Port Jackson, in New South Wales between August and December, 1824 '. He was collecting along the Brisbane River in Sept. 1824. No. 90 in the list was collected ' near Cox's River, Western Country ' in December, 1824. No. 91 is not explicitly localised, but from Heward's account of Cunningham's life, it is clear that Cunningham was in the Bathurst area in Dec. 1824 and Jan. 1825. The Bathurst locality is therefore confirmed.

" The first valid publication of *E. mannifera* appears to be that of Mudie in Trans. Med.-Bot. Soc. Lond. 1832-1833, 24 (1834). Although Mudie does not mention Cunningham in the article on the Eucalyptus manna in which the name appears, there can be no reasonable doubt that Mudie was quoting Cunningham since the diagnosis is the same as that of the Cunningham ms. except for some trivial alterations and the account of the manna is that of Cunningham slightly embroidered. The name should therefore be cited as *E. mannifera* A. Cunn. in Mudie* and the type specimen is that referred to above."

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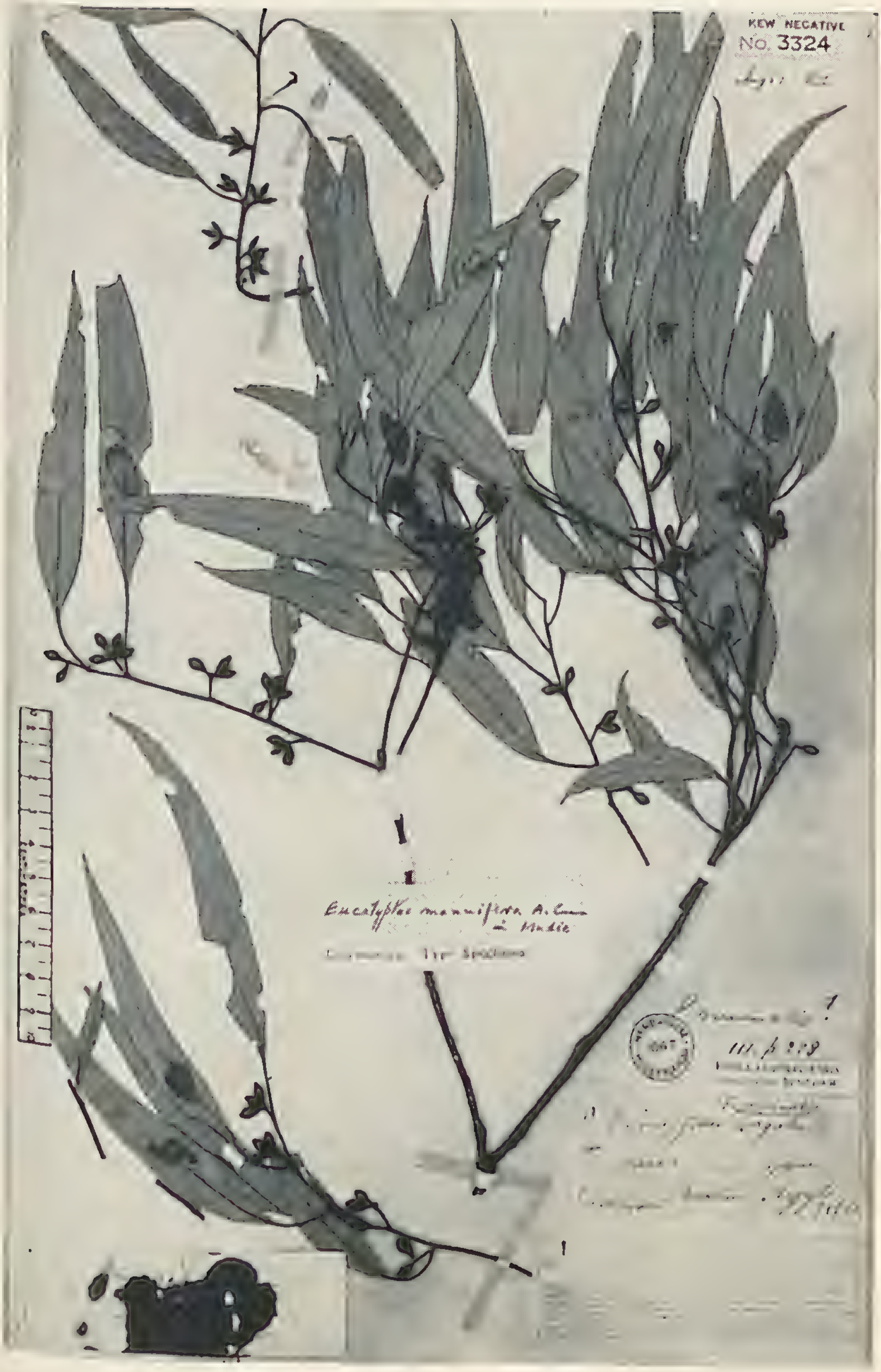
* This does not seem justified under the Code. Citation of Mudie alone as author seems all that is desirable. L.J.

Plate II.



Type sheet of *Eucalyptus mannifera* Mudie.

I have seen photographs of all the specimens mentioned by Dr. Melville, and the HOLOTYPE sheet is shown in Plate II. If the small piece at the top left (probably = *E. viminalis*) is excluded, this specimen, of which I have examined a piece, certainly represents one of the common forms of *E. maculosa* found in the hills around Bathurst, New South Wales, and the name *E. mannifera* Mudie must be used for any specific concept including this form. Various other forms will be mentioned below.

LECTOTYPES of some of the various synonyms require selection as follows: *E. maculosa* R. T. Bak. (Charley's Forest, Monga, N.S.W., W. Bäuerlen 9.1898, NSW 54074, belonging to the narrow-leaved race); *E. lactea* R. T. Bak. (Ilford, N.S.W., R. T. Baker before 1900, NSW 54075, belonging to the coarse, glaucescent race; the HOLOTYPE of *E. praecox* Maiden belongs to the same form; some of the material placed by Baker under *E. lactea* probably represents hybrids of *E. rubida*); *E. gullickii* R. T. Bak. et H. G. Sm. (Lawson, N.S.W., C. F. Laseron 8.1919, NSW 6255, belonging to the coarse-fruited " sandstone " race with narrow juvenile leaves).

E. mannifera, as here interpreted, comprises a number of ecological and geographic races which intergrade where they come in contact but for which taxonomic distinction as subspecies is desirable.

Detailed treatment of these cannot be given at this stage but it will be useful to establish the necessary names. The subspecific names are intended to apply broadly to populations as a whole; there is much variation within the recognised populations as well as intergradation between them, and individuals cannot always be assigned on morphological features to a particular subspecies.

(a) **E. mannifera** ssp. **mannifera.**

The type race, with moderately broad leaves, is widespread on the Central Tablelands of New South Wales and similar forms occur in the western part of the Southern Tablelands and the South-western Slopes. It intergrades with sspp. *maculosa* and *praecox* and perhaps with ssp. *gullickii.*

(b) **E. mannifera** ssp. **maculosa** (*R. T. Bak.*) *L. Johnson*, **comb. et stat. nov.**

E. maculosa R.T. Bak. in Proc. Linn. Soc. N.S.W. XXIV (1900) 598 (BASIONYM).

This is the common race with narrow, usually drooping foliage and small fruits found over much of the Central and Southern Tablelands districts, for instance around Canberra. It intergrades with ssp. *mannifera*, which in part occurs in the same general area and from which its claim to separation is perhaps doubtful, the ecological distinctions not being clear as yet, and probably with ssp. *gullickii.*

(c) **E. mannifera** ssp. **praecox** (*Maiden*) *L. Johnson*, **comb. et. stat. nov.**

E. praecox Maiden in Proc. Roy. Soc. N.S.W. XLVIII (1914) 423 (BASIONYM).
E. lactea R.T. Bak. in Proc. Linn. Soc. N.S.W. XXV (1901) 691, pro parte lectotypica.

In subspecific rank the epithet *praecox* is chosen for this taxon, because it is more satisfactorily typified and was not based on a mixed concept in the first place.

This is the race with broad juvenile leaves, rather broad adult leaves and often more or less pruinose buds found chiefly in the Upper Cudgegong River and Capertee districts. Some material from the Oberon district may belong here also. It intergrades with ssp. *mannifera* and is morphologically close to, though geographically separated from, ssp. *elliptica.*

(d) **E. mannifera** ssp. **elliptica** (*Blakely et McKie*) *L. Johnson*, **stat. nov.**

E. mannifera var. *elliptica* Blakely et McKie in Blakely, Key Euc. (1934) 148 (BASIONYM).

This race, which Blakely confused with the northern form of *E. dalrympleana* under "*E. mannifera*", is found along the western edge of the Northern Tablelands of New South Wales, from the Nandewar and Moonbi Ranges to Nundle and the Tomalla Tableland north of Barrington Tops. It does not occur on the Liverpool Range which consists of unsuitable basalt country. It is characterised by large orbicular juvenile leaves, broad adult leaves and rather large rounded buds and fruits on long pedicels. In the northern half of its range the buds and branchlets are usually glaucous. It is geographically well separated from other races but morphologically is close to ssp. *praecox* and some individuals would not be distinguishable from that subspecies. Despite this, these northern populations have not previously been recognised as belonging to the same species as the southern "*E. maculosa*", and prior to field investigation of New England "*E. mannifera*" several years ago were not distinguished from *E. dalrympleana* ssp. *heptantha*, which likewise was not recognised as belonging to *E. dalrympleana*.

(e) **E. mannifera** ssp. **gullickii** (*R. T. Bak. et H. G. Sm.*) *L. Johnson*, **comb. et stat. nov.**

E. gullickii R.T. Bak. et. H.G. Sm., Res. Euc. Ess. Oils., ed. 2 (1920) 128 (BASIONYM).

It its typical form this is a rather distinctive race with acute buds, short thick pedicels, narrow-elliptical or oblong juvenile leaves and non-drooping adult foliage of moderate breadth. It is confined to poor soils on Triassic and Permian sandstone tableland country from the Blue Mountains to the Bundanoon and Pigeon House Range districts of the Central and Southern Tablelands. It appears to intergrade in the Wingello district with ssp. *maculosa* and perhaps ssp. *mannifera* but elsewhere is fairly sharply separated. At times in exposed sites it may be reduced to mallee-like habit.

The various races of *E. mannifera* hybridise with other species of section Macrantherae with which they come in contact, for instance *E. viminalis*, *E. rubida*, *E. deanei* and others.

Blake (in Proc. Roy. Soc. Queensl. LXIX (1958) 85) refers certain material from southern Queensland to *E. mannifera*. I have not seen his specimens and the account is vague and contains confusion with trees known in New England as "*E. huberiana*". For the most part the latter are the results of hybridisation between *E. viminalis* Labill. and *E. nova-anglica* Deane et Maiden, sometimes on an extensive scale, affecting whole populations. These so-called "*huberiana*" trees have nothing to do with any part of "*E. mannifera*" sensu Blakely, and at present I cannot say what Blake's specimens of "*mannifera*" may be.

E. scoparia Maiden, of the extreme Northern Tablelands of New South Wales and the adjacent Wallangarra district of Queensland, is very closely related to *E. mannifera* but is probably sufficiently well separated to be treated as a distinct species.

E. corticosa *L. Johnson*, **sp. nov.**

HOLOTYPE: About 3 miles E of Currant Mountain Gap, about 8 miles E of Olinda, N.S.W., 2,500 feet, L. A. S. Johnson 9.4.1955 (NSW 54076), with buds, flowers and fruit.

Arbor parva vel staturae mediocris habitu irregulari, cortice trunci et ramorum majorum persistenti, molliter subfibroso, crasso tessellatoque, ramis minoribus laevibus et roseo-albis vel albis. Folia juvenilia primum opposita mox subalterna, primum subsessilia mox breviter petiolata, linearia vel oblongo-lanceolata 2·5-6 cm. longa, 0·3-1·8 cm. lata, aliquanto cinereo-viridia sed non glauca. Folia adulta saepe pendula, quasi alterna, petiolata, anguste lanceolata aliquanto obliqua falcataque, 7-20 cm. longa, 1-2·5 cm. lata, viridia vel aliquanto cinereo-viridia sed non pruinosa, venatione modice regulari venis angulum circiter 30-40° cum costa media formantibus, vena intramarginali regulari, prope marginem. Inflorescentiae axillares, cymosae umbelliformes 7-florae, pedunculo vix compresso 5-10 mm. longo. Alabastra breviter pedicellata vel nonnumquam subsessilia, acute clavata vel clavato-fusiformia vel breviter acuteque subcylindrica, 4-5 mm. longa, operculis duobus, exteriore praemature abscisso, interiore mucronato-hemisphaerico vel conico quam hypanthio aliquantulo breviore, hypanthio infundibuliformi vel subcylindrico. Filamenta alba, omnia fertilia; antherae versatiles rimis parallelis dehiscentes glandula globulari. Fructus breviter pedicellati vel subsessiles, obovoidei vel piriformes 4-6 mm. longi, 4-5 mm. diametro, disco convexo nonnumquam suberecto 1·0-1·5 mm. lato, capsula plerumque 3-loculari interdum 2- vel 4-loculari valvis exsertis plus minusve incurvis late triangularibus obtusiusculis.

DISTRIBUTION: Three disjunct areas on sandy soils: (a) Upper Cudgegong Valley about 20 miles east of Rylstone, Central Tablelands, N.S.W. (b) extreme South Coast, near Timbillica, N.S.W. (c) Grampians, western Victoria.

SPECIMENS EXAMINED: NEW SOUTH WALES: 3 miles E of Currant Mountain Gap, i.e. 8 miles E of Olinda, 2500 feet, L.A.S. Johnson 31.8.1951 (NSW 54077); about 3 miles E of Currant Mountain Gap, L.A.S. Johnson 9.4.1955 (NSW 54076); 5 miles W of Mt. Coricudgy, L.A.S. Johnson, 31.8.1951 (NSW 54078); Western Sawmills (Kelgoola), about 18 miles E of Rylstone, C.K. Ingram 29.8.1952 (NSW 54079); foot of Mt. Coricudgy, per H. Richardson 9.1952 (NSW 54080); Dinner Creek, 8 miles N of Victorian border (N of Timbillica), L.A.S. Johnson 18.4.1960 (NSW 54082); Dinner Creek, 6½ miles SW of Narrabarba, E.F. Constable 15.6.1960 (NSW 54081). VICTORIA: Near Wartook Reservoir, ca. 3000 feet, W of Hall's Gap, Grampians, L.A.S. Johnson 29.8.1958 (NSW 47211).

This species greatly resembles *E. mannifera* in herbarium specimens but is strikingly distinguished in the field by its soft, rough, more or less tessellated bark. It occurs in considerable quantity in each of its three widely disjunct areas but has not been found in intervening localities. In all cases it occurs on sandy soils, sometimes rather deep, in dry sclerophyll forest of poor form, and the trees are very similar in appearance in all the localities. In the Grampians it was seen at low altitudes in the valleys as well as at high levels, but always on sandy soil. The Grampians tree was immediately recognised in the field as the same species as *E. corticosa* from the Cudgegong River. However, the Grampians material seen differs slightly from the type form in its less ashy-green leaves and more sessile buds and fruits. The Dinner Creek material closely resembles that from the Cudgegong.

It seems that this species has been overlooked in Victoria, or confused with *E. aromaphloia* Pryor et J. H. Willis, another tree with similarities to *E. mannifera* but with rough bark like *E. corticosa*. However, *E. aromaphloia* differs in its broader juvenile leaves, shining adult leaves and aromatic bark. Moreover, it grows on a different type of country. The supposed locality for *E. aromaphloia* in Southern New South Wales, mentioned by Pryor and Willis in a note, in fact is the Dinner Creek locality for *E. corticosa*.

Hybrids between *E. corticosa* and *E. rubida* Deane et Maiden occur on the upper Cudgegong. These are very obvious in the field from the nature of the bark. Progeny from such trees shows the expected segregation in juvenile leaf characters. At the western end of the Cudgegong River occurrence *E. corticosa* and *E. mannifera* ssp. *praecox* may be found growing close together. They are very distinct in bark and shape of the juvenile leaves.

E. dalrympleana *Maiden*, For. Fl. N.S. Wales VII (1920) 137.

As pointed out above, much of the material referred by Blakely (1934) to *E. mannifera* Mudie in fact belongs to *E. dalrympleana*. This became evident in the course of my field study of New England eucalypts in 1957. Previously *E. dalrympleana* was not thought to occur on the Northern Tablelands of New South Wales at all, and it was considered to have exclusively 3-flowered inflorescences. In fact there is a great deal of it in New England, growing in its characteristic habitat and of very similar appearance to the *E. dalrympleana* of the south, but differing chiefly in the predominantly 7-flowered inflorescence. Although only a single evident character is involved the consistency is such that it may be useful to recognise two subspecies. The fruits of the northern race tend to be smaller, but this difference is not absolute.

(a) **E. dalrympleana** ssp. **dalrympleana.**

This is well-known, and is found over a wide range on the Central and Southern Tablelands of New South Wales as well as in Victoria and Tasmania. It has constantly 3-flowered inflorescences. Extensive marginal hybridisation with the closely related *E. rubida* is found where the species come into contact but on the whole they are readily distinguishable. Occasionally on the mainland, and perhaps more frequently in Tasmania, hybrid swarms and introgressed populations are found involving *E. dalrympleana* ssp. *dalrympleana* and *E. viminalis* Labill. This has led to a reluctance to recognise the two as fully distinct species in Tasmania but on the mainland there is no doubt of their separateness, ecologically as well as morphologically. In my view, they are not even especially close within their general group. I have seen a considerable amount of Tasmanian material which is quite definitely referable to one or the other species and suggest that the hybridism has been overstated there. The statement by Curtis (Stud. Fl. Tas. I (1956) 210) that " the species known in Tasmania as *E. dalrympleana* differs from the mainland type and may prove to be not conspecific " and that there are differences in the juvenile leaves, is without foundation and apparently based on imperfect knowledge of the mainland populations.

(b) **E. dalrympleana** ssp. **heptantha** *L. Johnson*, **subsp. nov.**

HOLOTYPE: Wandsworth to Moredun Creek, N.S.W., about 3,000 feet, L. A. S. Johnson 23.5.1957 (NSW 41849), buds, fruit, coppice and adult leaves.

A subspecie typica inflorescentiis 7-floris et fructibus saepe minoribus differt.

As mentioned above, this is widespread on suitable sites through much of the Northern Tablelands district of New South Wales. From Wilson's Downfall near the Queensland border to the tableland above Nundle the subspecies is almost constantly 7-flowered, and like ssp. *dalrympleana* has shining green leaves. Further south on the Tomalla Tableland, Barrington Tops and the high western end of the Liverpool Range the inflorescence varies from 3- to 7-flowered, both numbers and intermediate conditions usually occurring on any one tree, and the leaves have a duller green surface than either more northern or more southern populations. There is no suggestion of extensive hybridism in most of these populations. However, one may find occasional hybrids with *E. viminalis.*

E. rubida is found in very few places on the Northern Tablelands, but where it occurs pure it is 3-flowered as in the south. In places, for instance near Ben Lomond, there are small stands of trees resembling *E. dalrympleana* ssp. *heptantha* but with traces of glaucousness on the buds and some 3-flowered inflorescences. These suggest the former occurrence of *E. rubida,* that species now being represented only by descendants from its hybridisation with *E. dalrympleana* ssp. *heptantha.*

E. chapmaniana *Cameron* in Vict. Nat. LXIV (1947) 54.

This distinctive species has been thought to be confined to the Upper Kiewa-Mt. Bogong area of Victoria. However, it occurs also in mountainous country in New South Wales, north of the Upper Murray River. The following specimens from this State and from additional Victorian localities may be cited:

NEW SOUTH WALES: Khancoban State Forest, Toolong to Khancoban, 3,800 feet, B. U. Byles 28.11.1931 (NSW 41822); Khancoban State Forest, B. U. Byles 2.7.1935 (NSW 54083). VICTORIA: Mt. St. Bernard, J. H. Maiden 1.1900 (NSW 54084); Wentworth River, A. W. Howitt (NSW 54085, MEL).

The former Khancoban State Forest no longer exists as such but Mr. B. U. Byles has kindly provided detailed directions for finding this species. These are available at the New South Wales National Herbarium.

E. goniocalyx *F. Muell. ex Miq.* in Nederl. Kruidk. Arch. IV (1859) 134, s. orig., non auct.

E. elaeophora F. Muell., Fragm. IV (1864) 52.

E. cambagei Deane et Maiden in Proc. Linn. Soc. N.S.W. XXV (1900) 106.

E. cordieri Trabut var. *brachypoma* Blakely, Key Euc. (1934) 147.

HOLOTYPE: Buffalo Range, Victoria, F. Mueller (MEL). ISOTYPE in NSW (54058).

There is no doubt that the type of *E. goniocalyx* F. Muell. ex Miq. belongs to *E. elaeophora* F. Muell. and not to the species known as "*E. goniocalyx*" by Blakely (1934) and other recent authors. Since *E. goniocalyx* has priority it must be used in place of *E. elaeophora* for this species and "*E. goniocalyx*" auct. must be renamed (see *E. cypellocarpa,* below).

Although there is no doubt about the original application of *E. goniocalyx* as described by Miquel, confusion began in the following year when Mueller (in Fragm. Phytogr. Austral. II (1860) 48) applied the name to a mixture of both species, but apparently with *E. cypellocarpa* chiefly in mind. Then in 1864 he redescribed the original species, from another type, as *E. elaeophora.* Maiden (in Crit. Rev. Gen. Euc. II (1913) 267-8) was aware of the situation, though there are some slight errors in his account. He remarked "I think it would cause endless confusion to attempt to suppress *E. goniocalyx,* F. v. M., now, redescribing the smooth-barked gum (which is the tree universally accepted now as *E. goniocalyx*) under another name". However, under the International Code of Botanical Nomenclature, the change now made is unavoidable, even though temporary confusion will ensue.

Hybrid swarms between the two species concerned have been described from Victoria by Clifford (Proc. Roy. Soc. Vict. LXV (1953) 30-53), and Clifford and Binet (Austral. Journ. Bot. II (1954) 325-336), and some *E. cypellocarpa* populations in the Nandewar Mountains of New South Wales, as well as near Hillgrove in eastern New England, suggest a history of similar hybridism, at least in part. Nevertheless, over most of their distribution the species are well separated geographically, ecologically and morphologically, and there is no doubt as to the identity of the various Type specimens. The Holotype of *E. cordieri* var. *brachypoma* certainly belongs here. It is not in the least glaucous, and Blakely's description is erroneous in this respect. *E. goniocalyx* s. orig. is found in New South Wales, Victoria and South Australia. References to " *E. goniocalyx* " from South Australia in fact apply to the species in this sense, and not to the species now to be called *E. cypellocarpa*, as was thought. *E. cypellocarpa* reaches its western limit in the Grampians of western Victoria, where I have collected it.

E. banksii Maiden is very similar to *E. goniocalyx* s. orig., rather than to *E. bridgesiana* R. T. Bak. as has been thought. It may be regarded as a northern vicariad of *E. goniocalyx.*

The relationship of *E. goniocalyx* to *E. nortonii* (" *E. cordieri* " sensu Blakely) is discussed below.

E. nortonii (*Blakely*) *L. Johnson*, **stat. nov.**

E. cordieri Trabut var. *nortonii* Blakely, Key Euc. (1934) 147 (" *Nortoni* ") (Basionym).

E. goniocalyx F. Muell. ex Miq. var. *pallens* Benth., Fl. Austral. III (1867) 230; non *E. pallens* DC.

Holotype: Woolomin, N.S.W., E. A. Norton 5.1927 (NSW 54073), buds, fruits, adult and intermediate leaves. Blakely cited two localities, this was the only one with collector cited and was labelled " Type " by Blakely. It may be accepted as the holotype.

Misapplied Name: " *E. cordieri* " sensu Blakely, Key Euc. (1934) 147, non Trabut in Bull. Stat. Rech. For. Nord. Afr. I (1917) 149 (see below).

As interpreted here this corresponds to the whole of the material included by Blakely (1934) under " *E. cordieri* ", with the exception of var. *brachypoma*, which belongs to *E. goniocalyx* F. Muell. ex Miq., s. orig. (see above). Blakely's description under var. *nortonii* is in English but is quite adequate, and being published before 1935 the name is valid.

The reasons for the change of name for this species are set out below.

E. cordieri Trabut is a mixed concept, based on two elements. Since it was published in an obscure journal, it will be helpful to reprint the protologue in full, as follows:—

" Dès 1873, M. Cordier observait dans des semis d'*E. goniocalyx* F. Muell. des sujets ayant beaucoup d'analogie avec l'*E. globulus* et il faisait figurer (fig. 4) dans un bel Atlas qu'il a légué au Laboratoire de botanique de l'Ecole d'Agriculture, une forme qu'il appelait: ' *E. goniocalyx* hybridé d'*E. globulus* '.

" Il existe encore dans la collection Cordier un certain nombre de ces sujets, intermédiaires entre l'*E. goniocalyx* et *E. globulus.* Je propose de les nommer *E. Cordieri* en souvenir du premier botaniste qui a reconnu le rôle important joué par l'hybridation dans la multiplicité des formes d'*Eucalyptus* obtenues dans les cultures.

"*Eucalyptus cordieri*, Trab. (*E. goniocalyx* × *Globulus*).—(Cordier Atlas Eucalypt. 1873 pl. 28).—(Pl. XV).—Arbre élevé, ayant l'apparence de l'*E. globulus*. Feuilles juvéniles des repousses opposées, arrondies cordiformes à odeur d'*E. globulus;* feuilles adultes épaisses, lancéolées, falciformes très semblables à celles de l'*E. globulus;* ombelles axillaires de 3-7 fleurs; pédoncules comprimés courts; fleurs sessiles; bouton pruineux; tube calycinal anguleux, opercule débordant légèrement le tube, hémisphérique, mucroné; fruit assez variable, souvent avec un angle, de 8 à 10 mm. de diamètre, à 3-4 valves triangulaires ne se redressant pas, parfois incluses le plus souvent au niveau du bord du tube calycinal.

"Il semble que cette forme soit apparue dans des semis de graines provenant d'Australie, ce qui me porte à croire que si les botanistes australiens ne paraissent pas bien fixés sur les limites de l'*E. goniocalyx* et si une observation attentive de cette espèce les a amenés à en séparer notamment l'*E. cambagei* Deane et Maiden, l'*E. eloeophora* F. Muell., l'*E. paludosa* R.T.B., et d'un autre côté de distraire du *Globulus* l'*E. Maideni* F. Muell., c'est qu'ils se trouvent en présence de formes issues de l'hybridation. Il semble même que l'*E. goniocalyx* se joigne a l'*E. botryoides* par d'autres formes intermédiaires."

Trabut's Fig. 4 is taken from a watercolour in Cordier's unpublished Atlas. It shows a twig with pendulous leaves, definitely 3-flowered inflorescences, large buds and flowers, and is reasonably consistent with some such hybrid origin as that suggested by Trabut. It is certainly *not* the species treated by Blakely as "*E. cordieri*". On the other hand Trabut's Plate XV is a photograph showing buds, fruits, an adult and a juvenile leaf which could very well belong to the species treated by Blakely. This shows 7-flowered inflorescences and smaller fruits and buds and a more or less orbicular juvenile leaf. It is not quite certain, of course, that Pl. XV does in fact represent Blakely's species; it could conceivably, though improbably, represent a plant of hybrid origin also.

It is clear, I think, that Trabut's primary intention was to describe the putative hybrid figured by Cordier, and represented by his own figure 4. The words "Arbre élevé, ayant l'apparence de l'*E. globulus*" would apply to such a hybrid, but not to Blakely's species. On the other hand, the shape of the juvenile leaves corresponds with Blakely's species and the "ombelles . . . de 3-7 fleurs" can apply only to a mixture of the plants represented in fig. 4 and Plate XV respectively. The remainder of the description could apply to either.

Blakely simply took up *E. cordieri* without comment; he did not appear to be aware that it was a mixed concept and he cannot be considered to have made any actual choice of a lectotype. Since Trabut's primary concept was based on Cordier's plant and since for wild species it is desirable where possible to use names typified by wild-growing plants from pure populations, I select Trabut's fig. 4 as LECTOTYPE of *E. cordieri* Trabut. Var. *nortonii* Blakely, which is well typified from a known wild population, is raised to specific rank to cover the Australian species.

There is a cline from the large-flowered and coarse-fruited northern populations to which the type of *E. nortonii* belongs to the southern forms which in shape of these organs resemble *E. goniocalyx* s. orig. It is convenient to have the type at the most distinctive end of this cline. It has been suggested that *E. nortonii* and *E. goniocalyx* s. orig. are not specifically distinct. They are certainly very closely related and specimens from southern localities are separable chiefly by presence or absence of glaucousness. Nevertheless, they occur in uniform and separate populations, with some ecological distinction, though there may be interbreeding in places. For the present, and perhaps permanently, it is useful to recognise *E. nortonii* as a distinct species. Unlike *E. goniocalyx*, it is absent from South Australia.

A hybrid swarm between *E. nortonii* (as "*E. cordieri*") and *E. bicostata* is described from near Beechworth, Victoria, by Pederick (Austr. Forestry XXV (1961) 36-39).

E. cypellocarpa *L. Johnson*, **sp. nov.**

E. goniocalyx F. Muell. ex Miq. var. *acuminata* Benth., Fl. Austral. III (1867) 230.

E. goniocalyx var. *parviflora* Blakely et McKie in Proc. Linn. Soc. N.S.W. LXII (1928) 66.

HOLOTYPE: Sawmill to Wynne's Rocks, Mt. Wilson, 3,100 feet., N.S.W., L. A. S. Johnson 23.4.1949 (NSW 14571). Buds, fruits, juvenile and adult foliage.

MISAPPLIED NAME: "*E. goniocalyx*" auct. plur. non F. Muell. ex Miq., e.g. Blakely in Key Euc. (1934) 157.

Arbor usque ad 45 m. altus sed saepe minor, cortice plerumque laevi sed versus basin saepe plus minusve persistenti, ligno pallido, fissili. Folia juvenilia opposita sessilia vel brevissime petiolata, basi cordata, late lanceolata, plus minusve glauca, circiter 6-12 cm. longa, 2-6 cm. lata. Folia adulta plerumque pendula, quasi alterna, petiolata, anguste lanceolata 10-40 cm. longa, (1·5-) 2-3·5 cm. lata. Inflorescentiae axillares, cymosae umbelliformes typice 7-flora, pedunculo compresso circiter 7-20 mm. longo. Alabastra breviter vel nonnunquam longiuscule pedicellata, acute clavata vel subcylindrica 7-14 mm. longa, 3-6 mm. diametro, hypanthio plus minusve 1-3- (4-) costato. Opercula duo, exterius praemature abscissum, interius conicum vel hemisphaerico-conicum, hypanthio brevius vel subaequale. Filamenta alba omnia fertilia, antheris versatilibus obovatis rimis parallelis late dehiscentibus, glandula globulari magna. Fructus pedicellati obovoidei, pirformes vel nonnunquam paene obconici, 4-10 mm. longi, 5-10 mm. diametro, disco oblique depresso 1-3 mm. lato, capsula inclusa plerumque 3- (4-) loculari, valvis suberectis incurvisve, inclusis vel exsertis.

This is the species, widespread in eastern New South Wales and in Victoria, which has been universally known as *E. goniocalyx*. Unfortunately, as pointed out above, the type of *E. goniocalyx* F. Muell. ex Miq. belongs to the species generally known by its later synonym of *E. elaeophora* F. Muell., and "*E. goniocalyx*" auct. has been without a valid name.

Neither *E. goniocalyx* var. *acuminata* nor var. *parviflora* represents a distinctive population. The following is selected as LECTOTYPE of var. *parviflora;* 2 miles from Hanging Rock, N.S.W., E.N. McKie 28.10.1930 (NSW 54055), flowers, buds, fruits.

The epithet "*cypellocarpa*", from Greek *kypellon*, a cup or goblet, and *karpos*, fruit, refers of course to the fruit shape.

Hybridisation and introgression involving *E. goniocalyx* s. orig. are mentioned above, under that species.

E. pryoriana *L. Johnson*, **nom. et stat. nov.**

E. viminalis Labill. var. *racemosa* F. Muell. ex Blakely, Key Euc. (1934) 162; F. Muell. ex Maiden, Crit. Rev. Gen. Euc. III (1916) 182, nomen nudum; pro parte typica (BASIONYM); non *E. racemosa* Cav. (1797).

HOLOTYPE: Port Phillip, Victoria, ex herb. (& leg.?) F. Mueller 2.1880 (NSW 54126). There is probably an ISOTYPE in MEL (not seen) but the NSW specimen seen by Blakely must be the holotype.

This occurs, as uniform populations of small spreading trees with the trunk and main limbs covered with rough, shortly fibrous dark bark, in a number of localities near the sea in southern Victoria, and according to L. D. Pryor (personal communication) similar trees are found also near Port Lincoln, South Australia, there with 7-flowered inflorescences (the type form is 3-flowered). I have seen it on sandy, almost flat country north-east of Western Port and to the east of Koo-Wee-Rup, where it occasionally hybridises with *E. cephalocarpa* Blakely.

The Tasmanian and New South Wales localities cited by Blakely apply to *E. viminalis*, not *E. pryoriana.*

The species needs further study but seems quite distinct from any of the forms which must be included in the specific concept of *E. viminalis.* It is named in honour of my friend Professor L. D. Pryor who has contributed so much to the understanding of *Eucalyptus* and who has drawn attention to the distinctions of this species in the field. It is difficult to recognise in herbarium material, at least until a complete study of *E. viminalis* is made. The so-called " racemose inflorescence " merely consists of leafless lengths of branchlets bearing the umbelliform cymes. This characteristic is common but probably not diagnostic.

E. moluccana *Roxb.*, Fl. Ind. II (1832) 498; Hort. Bengal. (1814) 92, nomen nudum.

E. hemiphloia F. Muell. ex Benth., Fl. Austral. III (1867) 217.

This is a most unfortunate change of name for a well-known species but is necessary under the International Code of Botanical Nomenclature. I have seen a photograph of an ISOTYPE and have examined a leaf and anther of the specimen itself, which is in bud and flower, and there is no doubt that they are characteristic of typical *E. hemiphloia* in all details. This specimen, in BM, is labelled: "*Eucalyptus moluccana* Roxb. TYPE " and on the back of the sheet: " Amboyna. Ch. Smith. Dr. Roxburgh (Hb.) A. B. Lambert ". It agrees entirely with Roxburgh's description of 1832.

As to the status of this specimen as a type, Dr. J. E. Dandy writes (in litt. 11.4.1958); " The name *E. moluccana* was first published as a nomen nudum, in Roxburgh's Hortus Bengalensis, 92 (1814) with ' Moluccas ' given as the locality but no indication as to collector; but as on other pages of the same work Roxburgh lists other plants as having been introduced from the Moluccas by C. Smith, we may assume that he thought this Eucalyptus to have had the same origin. The name *E. moluccana* is in fact listed in the part of ' Hortus Bengalensis ' which catalogues plants described by Roxburgh in his manuscript Flora Indica but not yet introduced into the Calcutta Botanic Garden, so that Bentham was wrong in stating that the species was described from a tree in that garden. It is clear that Roxburgh must have known the species only from dried material, and as the specimens of which we have sent you a photograph agrees with his description, it is presumably at least part of that dried material. Whether it is the only specimen which exists I am unable to say, as plants were distributed by Roxburgh to a number of places. This particular specimen came to us with Lambert's herbarium, purchased in 1842. It is no doubt to be regarded as at least an Isotype of *E. moluccana.* The fact that a ' type specimen ' label has been attached to it does not necessarily mean that it is really a holotype but simply that the specimen has type status ".

Whether this specimen really came from a tree growing in Amboina is impossible to say, but if so it must undoubtedly have been introduced there very early from Australia—the species is, of course, common in the area immediately west of Sydney. I am much indebted to Dr. Dandy for his assistance in clearing up this matter.

E. albens *Benth.*, Fl. Austral. III (1867) 219; S. T. Blake in Proc. Roy. Soc. Queensl. LXIX (1958) 87.

Blake has argued briefly that this name was first validly published by Bentham and that there is no objection to his use of it. I agree with this conclusion but the case perhaps needs a fuller statement.

Bentham cited Miquel (in Ned. Kruidk. Arch. IV (1859) 138) as authority for the species. Miquel (l.c.), however, cited DC. Prodr. III (1828) 219, n. 30, as well as giving *E. dealbata* A. Cunn. ex Schau. as a doubtful synonym. He gave no description but cited two specimens of Mueller's (one, Broken River, mis-cited as " Booker " River). There is no *E. albens* DC. but the reference cited clearly applies to *E. pallens* DC. According to Maiden (Crit. Rev. Gen. Euc. I (1903) 57) this is *E. obliqua* L'Hér. Certainly it is a member of the section *Eucalyptus* (" *Renantherae* ") and has nothing to do with the specimens cited by Miquel, the material described by Bentham, or with *E. dealbata* A. Cunn. ex Schau. Nevertheless, *E. albens* Miq. is clearly a mistake for *E. pallens* DC. and must be taken as a misapplication of that name to Mueller's material. The binomial *E. albens* is thus not validly published by Miquel.

At first sight, one might regard *E. albens* Benth. as being based by reference on *E. albens* Miq. and thus indirectly in turn on *E. pallens* DC. However, in his note Bentham says: " A very distinct species . . . . F. Mueller refers it to *E. pallens*, DC., which I have not seen. De Candolle's character agrees rather better with *E. dealbata* than with *E. albens*, but the short hemispherical operculum he describes occurs in neither ". He thus virtually excludes *E. pallens* DC. from his own concept.

One may take the view, in my opinion, that Bentham was in effect describing what he regarded as a new species, but for reasons of courtesy ascribed it to Miquel (whose cited specimens represented the same species), ignoring the fact that Miquel's use of the name was an erroneous reference to another species and not a deliberate proposal of a new species or a new name. On this reasoning it may be cited as *E. albens* Benth. and a lectotype may be chosen from any of the material cited by Bentham. In choosing a lectotype it would be best to avoid the South Australian material since the occurrence of *E. albens* there in the pure state is doubtful. The Macquarie River, Cunningham, collection would probably be the most suitable choice, but I have not seen it.

E. siderophloia *Benth.*, Fl. Austral. III (1867) 220, s. orig., non auct.

E. decepta Blakely, Key Euc. (1934) 249. (LECTOTYPE: Ramornie, N.S.W., W.F. Blakely and D. W. C. Shiress 7.1922 (NSW 54108). Here selected).

LECTOTYPE: Moreton Bay, A. Cunningham (K. ISOLECTOTYPE in NSW; 54107).

This is the common ironbark found in southern Queensland and the Coast district of New South Wales as far south as the Hawkesbury River, which has been known in recent years as *E. decepta*. The name *E. siderophloia* has been universally misapplied to the " Broad-leaved Ironbark ", *E. fibrosa* (see below).

Todd (in Kew Bull. (1953) 196-205) made an elaborate study of the types of *E. paniculata* Sm. and *E. siderophloia* Benth., especially as regards the anther-shapes. Her paper should be consulted for a list of the syntypes of *E. siderophloia*. Todd found that these represented a mixture of several elements but, acting on an apparently preconceived supposition of hybridity unbased on field knowledge of the species concerned, failed to identify these correctly. She claimed that the majority of the syntypes represented hybrids and suggested that large scale hybridism occurred amongst these ironbarks. The reverse is the case. Hybridism is very uncommon between different species of ironbarks, which grow on sharply defined sites, and this is quite evident to those who have studied eastern Australian eucalypts in the field and who are well-acquainted with the extensive hybridism which occurs in some other groups of eucalypts, and with the occasional hybrids and small hybrid swarms involving ironbarks on the one hand and boxes on the other.

From Todd's figures and descriptive matter, and from an examination of duplicates of some of the syntype material, it is evident that the allegedly hybrid material belongs in fact to *E. decepta* Blakely, a species of which Todd makes no mention, though Blakely's " Key to the Eucalypts " makes it clear that it is widespread and common in the areas concerned. The anthers of this well-defined species show all the shapes figured by Todd in her Fig. III, A-E. Variability of anther shape within these limits is certainly no indication of hybridism. On the evidence of mixture and the assumption of hybridity, Todd suggested that *E. siderophloia* be rejected as a *nomen ambiguum*. Much of the " confusion and error " was introduced into the case by the conclusions drawn in her own study, ill-advisedly though painstakingly carried out on the inadequate Kew material far from the natural populations.

Blake (in Proc. Roy. Soc. Queensl. LXIX (1958) 87) disagreed with Todd's suggestion of rejection, and claimed that Maiden (Crit. Rev. Gen. Euc. I (1908) 324) " had already recognised the problem and solved it by typifying the name on a part of Woolls's collection that agreed best with Bentham's description and which corresponded to the form to which the name has been commonly applied ". This is not the case. Maiden said only: " Specimens which most literally conform to Bentham's original description of *E. siderophloia* are some mixed ones of *E. paniculata* and *E. siderophloia* collected by Woolls at Parramatta ". He did not figure this material. This cannot be considered to be satisfactory selection of a lectotype. In the first place, he said that *a mixture* conformed best with the description; secondly, he was unaware of the existence of *E. decepta* as a distinct species; and thirdly, the statement is incorrect in fact since these are not the specimens which conform best with Bentham's description.

It appears that all of the known syntypes of *E. siderophloia* except one sheet (Parramatta, Woolls, W_1, W_2, W_3 of Todd, duplicate in N.S.W.) belong to *E. decepta*. The Woolls sheet at Kew is clearly a mixture including *E. paniculata* and other (dubious) material. The Woolls sheet in NSW carries a mixture of (i) *E. paniculata*, in fruit, (ii) *E. fibrosa* (" *E. siderophloia* " auct.), a small piece in fruit, (iii) probably *E. decepta*, in flower and bud, which can hardly be from Parramatta but may be from the Hawkesbury, (iv) either the narrow leaved " St. Mary's " form of *E. paniculata* (" *E. beyeri* " auct. non R. T. Bak. quoad typ.) or a hybrid between this and *E. crebra* F. Muell.

Thus, amongst the syntypes (and their duplicates) of Bentham's species only a very minor portion represents the Broad-leaved Ironbark, which has been commonly called *E. siderophloia.* There may have been none at all amongst the material seen by Bentham himself. His description fits *E. decepta* very well and tends to exclude the Broad-leaved Ironbark, which he appended as a variety, " Var. (?) *rostrata* ".

Recommendation 7B of the International Code of Botanical Nomenclature (1961) states, in part, that a " lectotype should be so selected as to preserve current usage unless another element agrees better with the original description and (or) figure." Current usage cannot be preserved, since the earliest name for the " Broad-leaved Ironbark " is *E. fibrosa* F. Muell. There is no doubt that the description applies best to *E. decepta* and that most of the syntypes belong there and the lectotype must be chosen from amongst these. I have accordingly chosen the Cunningham specimen as lectotype, and henceforth the name *E. siderophloia* Benth. must be used in this original sense.

Blake (in Austral. Journ. Bot. I (1953) 309) considers that *E. decepta* is not specifically distinct from *E. drepanophylla* F. Muell. ex Benth., described from North Queensland. This may be a justifiable view, but on the fairly extensive material in herb. NSW there has been no difficulty in separating *E. siderophloia* s. orig. (*E. decepta*) from *E. drepanophylla* and, at least until the supposedly intermediate Queensland populations have been studied in the field, I prefer to maintain them as distinct species. At the very least, subspecific distinction would be desirable. Since *E. drepanophylla* and *E. siderophloia* are of the same date, a choice would have to be made between them were they treated as conspecific.

E. fibrosa *F. Muell.* in Journ. Linn. Soc., Bot. III (1859) 87.

I have seen the Holotype of *E. fibrosa* (In montibus nemorosis ad flumen Brisbane, F. Mueller, MEL) which undoubtedly belongs to the species wrongly known as *E. siderophloia*, that is the " Broad-leaved Ironbark ". Blake (in Proc. Roy. Soc. Queensl. LXIX (1959) 87) argued that the name applied to *E. resinifera* Sm., but he had apparently not seen the Type. The typification of the later name *E. siderophloia* is discussed above.

E. nubila Maiden et Blakely, must, I think, be regarded as not specifically distinct from *E. fibrosa*, but two intergrading subspecies may be recognised;

(*a*) **E. fibrosa ssp. fibrosa.**

E. siderophloia Benth. var. (?) *rostrata* Benth., Fl. Austral. III (1867) 220.

The type subspecies occurs commonly in certain dry sclerophyll forests from north of Rockhampton, Queensland to near Bodalla on the South Coast of New South Wales. It extends inland in places, for instance to Herrie's Range on the Darling Downs, Queensland, to the Pilliga Scrub and, as an isolated occurrence, to the Harvey Ranges, New South Wales. For intergradation see below.

(b) **E. fibrosa** ssp. **nubila** (*Maiden et Blakely*) *L. Johnson*, **comb. et. stat. nov.**

E. nubila Maiden et Blakely in Maiden, Crit. Rev. Gen. Euc. VIII (1929) 38, " *nubilis* " (BASIONYM).

E. siderophloia Benth. var. *glauca* Deane et Maiden in Proc. Linn. Soc. N.S.W. XXIV (1899) 461.

This subspecies is distinguished by its highly pruinose branchlets, buds, fruits and leaves, and by the shorter operculum, generally smaller fruits with a less prominent disc and rather smaller leaves. The bark tends to be darker and harder than in ssp. *fibrosa*. It is found in the Chinchilla, Kogan, Millmerran and Inglewood districts of Queensland, and around Dubbo and Dunedoo and in the Goulburn River Valley of New South Wales. There is a considerable disjunction between the northern and southern populations. On the other hand there is a complete intergradation between ssp. *fibrosa* and ssp. *nubila* in the Goulburn River Valley and perhaps elsewhere. Ssp. *nubila* is not simply the " inland form " of the species; ssp. *fibrosa* is found in inland localities also as in the Pilliga Scrub and Harvey Range districts. Ssp. *nubila* is a " strong " subspecies which would readily be regarded as a species were it not for the extensive intergradation.

The epithet was originally written *nubilis*, but this is clearly an unintentional error for *nubila*. Latin *nubilus* means " dark or gloomy ", reflected in Blakely's English name " Dusky-leaved Ironbark ", while *nubilis* means " marriageable ", inapplicable here. Mr. H. K. Airy Shaw, of Kew, has expressed the view (in litt.) that " *nubilis* " is an unintentional orthographic error which should be corrected.

E. tetrapleura *L. Johnson*, **sp. nov.**

HOLOTYPE: Wells' Crossing, 1 mile N of Halfway Creek (Corindi to Grafton), N.S.W., L. A. S. Johnson and E. F. Constable 6.6.1957 (NSW 54122), in fruit.

Arbor parva vel staturae mediocris usque ad 20 m. alta, cortice trunci et ramorum sublamellosa rude corrugato " Ironbark " simili sed non indurato. Folia juvenilia ignota, intermedia adultaque eis *E. fibrosae* omnino similes vel textura aliquantula tenuioria. Inflorescentiae cymosae umbelliformes axillares et terminaliter quasi paniculatim dispositae, 7-florae, pedunculo subcompresso gracili 1·5-3 cm. longis, angulato-fusiformia circiter 1·3 cm. longa, hypanthio valde quadricostrato costis in pedunculo decurrentibus, operculis duobus, exteriore praemature abscisso, interiore elongato-conico hypanthium aequanti. Filamenta alba vel luteo-alba, exteriora sterilia; antherae plus minusve oblique insertae, truncatae, poris terminalibus dehiscentes. Fructus longe pedicellati, valde quadricostati, obconici vel piriformes, truncati, 9-11 mm. longi, 6-8 mm. diametro, disco paene verticaliter depresso circiter 2 mm. lato, capsula inclusa 4- (5-) loculari, valvis erectis sed in hypanthio inclusis.

DISTRIBUTION: Confined to a small area of sandy flats and ridges in Jurassic (Clarence) sandstone country near Grafton, North Coast of New South Wales.

SPECIMENS EXAMINED: Borden's Bridge, Clarence River, R. A. Oxenford 29.8.1948 (NSW 54123); Wells' Crossing, Pacific Highway, 15 miles S of Grafton, G. N. Baur 8.7.1952 (NSW 54124), Wells' Crossing, 1 mile N of Halfway Creek (Corindi to Grafton), L. A. S. Johnson and E. F. Constable, 6.6.1957 (NSW 54122); Wells' Crossing L. A. S. Johnson 23.4.1962 (NSW 57162); Grafton district, on Coff's Harbour road, R. W. Jessup, 1951 (NSW 54125).

E. tetrapleura has been confused with *E. fibrosa* which it resembles in foliage and bark, though the latter is perhaps even softer than is usually the case in *E. fibrosa*. However, it occurs in distinct populations in a particular habitat and is readily separated from the neighbouring populations of *E. fibrosa*. It is distinguishable from *E. fibrosa* by the strongly 4-ribbed hypanthium of buds and fruits (whence the epithet "*tetrapleura*", from the Greek), the elongated slender peduncles and pedicels, the strongly depressed disc and enclosed valves of the fruit, and especially by the presence of staminodia and anthers of "Terminales" shape, as in *E. paniculata*.

At Wells' Crossing *E. tetrapleura*, which was found in full flower while *E. fibrosa* was in bud, occurs on sandy flats with *E. seeana* var. *constricta*, while *E. fibrosa* is found with *E. maculata* on clay soils on higher ground nearby. However, Oxenford (NSW 54123) records it from a ridge of Jurassic sandstone. A specimen from Girard State Forest, R. J. Turner 22.4.1955 (NSW 57163), on sandy granitic soil, may also be this species. The species has been confused with *E. fergusonii* R. T. Bak., but the latter is definitely conspecific with *E. paniculata* Sm. and differs in the thinner, rather discolorous leaves with different venation and in the shorter pedicels and fruits.

E. panda *S. T. Blake* in Proc. Roy. Soc. Queensl. LXIX (1958) 87.

For some years observations have been continuing upon a stunted narrow-leaved ironbark occurring on sandy soils in part of the Central Western Slopes of New South Wales, which superficially greatly resembles *E. crebra* F. Muell. but differs fundamentally from that species in the shape of the anthers, and which is distinguished by beekeepers because it is said to flower in winter whereas *E. crebra* flowers in summer in the same area. The anther shape is that of Blakely's section *Terminales* and the relationships of the taxon are clearly not with *E. crebra* but rather with *E. paniculata* Sm.

In 1958 Blake described a small narrow-leaved ironbark from siliceous soils in the Carnarvon Range and Inglewood districts of Queensland, under the name of *E. panda*. It was suspected that *E. panda* might have affinities with the undescribed New South Wales Ironbark. Examination of an ISOTYPE of *E. panda* (Barakula State Forest, NNW of Chinchilla, Queensland, S. R. Stevens 21.10.1957), and other Queensland specimens, has confirmed this, and in fact the difference is so small that the two must at present be treated as conspecific, despite the considerable disjunction in distribution. Nevertheless, the differences between the Queensland and New South Wales populations are sufficient to justify the recognition of two subspecies:

1. Venation distinct, main lateral veins mostly 8-15 on each side of the midrib. Leaves 3·5-10 cm. long. Inflorescences axillary .... ssp. *panda*.

1.* Venation rather obscure, main lateral veins mostly 20 or more on each side. Leaves mostly 8-15 cm. long. Inflorescences both axillary and terminally paniculate ssp. *illaquens*.

(a) **E. panda** ssp. **panda.**

The typical subspecies appears to be confined to the Carnarvon Range, Chinchilla and Inglewood districts, Queensland. I did not find this subspecies on visits to the Inglewood and Chinchilla areas in 1954 and 1958.

(b) **E. panda** ssp. **illaquens** *L. Johnson*, **subsp. nov.**

HOLOTYPE: 2 miles E of Munghorn (Cooyal to Wollar), N.S.W., C. K. Ingram 22.11.1952 (NSW 54103), flowering and fruiting.

A subspecie typica foliis plerumque longioribus (8-15 cm.) venatione subobscura venis arctis, primariis lateralibus 20 vel pluribus, intramarginali prope marginem, inflorescentiis nonnullis apice quasi paniculatim dispositis, differt.

Distribution: On sandstone country in the Goonoo State Forest north-east of Dubbo and in the Goulburn River valley of New South Wales.

Specimens Examined: Goonoo State Forest, C. Gates 6.1946 (NSW 53502); Goonoo State Forest, J. H. Dyer 25.5.1953 (NSW 54102); Goonoo State Forest, R. J. Roberts 7.3.1959 (NSW 54106); Goonoo State Forest, Eumungerie, G. Chippendale & E. F. Constable 26.9.1951 (NSW 17810); 2 miles E of Munghorn (Cooyal-Wollar), C. K. Ingram 22.11.1952 (NSW 54103); Munghorn, C. K. Ingram 4.1953 (NSW 54104); Munghorn Hill, C. K. Ingram 30.5.1953 (NSW 54105); Cox's Gap, W of Kerrabee, 360 m. alt., E. F. Constable 13.9.1948 (NSW 8464). A number of other collections without flowers or mature buds may belong here, but cannot be determined with certainty. I have seen stands of the subspecies at Munghorn and Cox's Gap, but not in flower.

Blake mentions the superficial similarity of *E. panda* (ssp. *panda*) to forms of *E. crebra* but points out that they may be distinguished on leaf venation and the axillary inflorescences of the type form of *E. panda.* Unfortunately this does not apply to ssp. *illaquens*, which as yet I am unable to separate from *E. crebra* in the absence of mature anthers. When the latter are present there is, of course, no difficulty since *E. panda* has anthers of " Terminales " type, set obliquely on the top of the filaments, whereas *E. crebra* has normal " Porantheroideae " anthers. *E. crebra* occurs on a wide variety of soils including poor sandstone country, and may form large or small trees. *E. panda* ssp. *illaquens* is confined to poor sandstone country and is a stunted tree of poor form. It is known locally as " Corky Ironbark " and is said to flower several months earlier than *E. crebra* in the same district. However, specimens in flower in May, June, September and November have been seen.

The epithet *illaquens* is from Latin *illaqueo* " I ensnare or entrap ", referring to the difficulty of distinguishing this taxon from *E. crebra*, except by the anthers.

E. sideroxylon *A. Cunn. ex Woolls* in Proc. Linn. Soc. N.S.W. XI (1887) 859; Maiden in Crit. Rev. Gen. Euc. II (1910) 82; S. T. Blake in Proc. Roy. Soc. Queensl. LXIX (1958) 88.

Blake (l.c.) states that " the first formal description seems to be that given by Maiden (l.c.) where a reference to Cunningham's MS. journal is also given ". However, in 1887 Woolls definitely stated that he considered *E. sideroxylon* " A. Cunn." to be distinct from *E. leucoxylon* F. Muell., and gave a description of each species (p. 860), and the valid publication of the name must date from this.

Woolls had earlier (Lectures on the Vegetable Kingdom (1879) 123) published the following:

> " 5. *E. sideroxylon* (variety of *E. leucoxylon* F.M.) is the ironbark with red or pink flowers. The wood is dark."

This description is meagre, but probably sufficient, in its context, to characterise *E. sideroxylon.* However, it was regarded as a variety, and therefore was not validly published in this place.

E. sideroxylon is a widespread species, found in southern Queensland, New South Wales and Victoria, and local populations often exhibit differences from each other, as well as a range of individual variation. For instance glaucousness, fruit size, and development of ribs on the fruits vary considerably. Filament colour, of which much is made horticulturally, is a trivial character so far as the natural populations are concerned, though its incidence appears to differ in different stands. The horticultural use of the name " *E. sideroxylon* var. *rosea* " is quite unjustifiable since the typical form as regarded by Woolls is pink-flowered. A stunted, rather mallee-like form is found in mallee country between Rankin's Springs and West Wyalong, New South Wales, but this has no other distinctive characteristics. There is, however, one major geographic race which it is convenient to distinguish from the remainder, and two subspecies may therefore be recognised:

(a) **E. sideroxylon** ssp. **sideroxylon.**

E. leucoxylon F. Muell. var. *pallens* Benth., Fl. Austral. III (1867) 210.

E. leucoxylon var. *minor* Benth., l.c. (Lectotype: Parramatta, Woolls, K; not seen, but there is no doubt of its identity.)

This occurs in the Darling Downs district of Queensland, on the western edge of the Northern Tablelands, at intervals in all subdivisions of the Western Slopes and in the eastern parts of the Western Plains, as well as on the Central Coast (type area) of New South Wales; and in northern and central Victoria. It is characterised by the 7-flowered inflorescence and small to medium-sized fruits (6-10 x 5-8 mm.); glaucous bloom is often but by no means always present. Hybrids with a number of species of section *Porantheroideae* (incl. *Terminales*) are found, sometimes forming small swarms.

(b) **E. sideroxylon** ssp. **tricarpa** *L. Johnson*, **subsp. nov.**

Holotype: Tilba Tilba to Wallaga Lake, N.S.W., L. A. S. Johnson 20.11.1950 (NSW 54090), flowering and fruiting.

A subspecie typica inflorescentiis semper trifloris et floribus fructibusque magnis (fructibus 10-15 mm. longis. 9-15 mm. diametro) differt.

Distribution: South Coast of New South Wales and eastern Victoria on hilly country in dry sclerophyll forest.

Specimens Examined: New South Wales: Mudmelong, Araluen, J. H. Maiden 12.1892 (NSW 54088); Wagonga (near Narooma), J. S. Allan 7.8.1897 (NSW 54089); Tilba Tilba to Wallaga Lake, L. A. S. Johnson 20.11.1950 (NSW 54090); Bermagui, W. Dunn 12.1914 (NSW 54091); Merimbula, P. Murphy 6.1926 (NSW 54092); Eden, H. H. Rose 20.8.1918 (NSW 54093); Eden (NSW 54094); Nadgee, W. R. Newton 7.1913 (NSW 54095). Victoria: Orbost, J. S. Gregson 4.1927 (NSW 54096); Red Knob via Swan Reach, J. H. Maiden 7.1908 (NSW 54097); Bruthen to Double Bridges, R. H. Cambage, No. 3675, 16.1.1913 (NSW 54098).

It is possible that this constantly 3-flowered, large-flowered, large-fruited, always non-glaucous race may intergrade with ssp. *sideroxylon* in Victoria. It certainly does not come in contact with it in New South Wales and might even be regarded as specifically distinct if intergrades are not found in Victoria. Individuals with 3-flowered inflorescences may sometimes be found within the range of ssp. *sideroxylon* in Victoria, but many, at least, of these are attributable to hybridisation with *E. leucoxylon* F. Muell., as shown in characters of the bark and juvenile leaves.

E. umbra *R. T. Bak.* in Proc. Linn. Soc. N.S.W. XXV (1901) 687, t. 44; S. T. Blake in Proc. Roy. Soc. Queensl. LXIX (1958) 86.

Blake synonymises *E. carnea* R. T. Bak. with *E. umbra*, stating that " they appear to be extreme forms of one species " and that " they are commonly found growing together throughout eastern Queensland (at any rate), and there is a range of intermediate forms ". I agree with Blake that one cannot maintain these two as separate species. Nevertheless in New South Wales, at least, the great majority of populations can be referred to one or the other and each has a distinctive appearance in the field, due to the dark green foliage of *umbra* and the rather bluish-green (but not pruinose) foliage of *carnea*. These differences are correlated with the fruit differences on which they have traditionally been separated. In New South Wales they occupy different habitats, *umbra* being found on poor siliceous soils not far from the sea, whereas *carnea* grows on stony but less siliceous hillsides, often well away from maritime influence. There is some intergradation in the Hunter River-Wyong district but elsewhere in this State it is absent. I have limited field experience of the Queensland populations, but it certainly appears that the distinctions are less clear there, though I suspect that the forms are not always as haphazardly mixed as Blake's statement suggests.

It will be useful to recognise two subspecies. For populations in which the distinction cannot be made the binomial *E. umbra* may still be used alone, in Blake's sense. Lectotypes for both names have been chosen by Blake (l.c.).

(a) **E. umbra** ssp. **umbra.**

The type subspecies occurs in New South Wales on sandy soils within 10-15 miles of the sea and under the influence of winds from the ocean. There is an area of it in the region of Barcoongere State Forest near Corindi, north of Coff's Harbour. It then reappears near Port Stephens and is found almost continuously from there to the northern shores of Port Jackson. Some Queensland material appears to match this but the ecological situation there has not been clarified.

(b) **E. umbra** ssp. **carnea** (*R. T. Bak.*) *L. Johnson*, **comb. et. stat. nov.**

E. carnea R. T. Bak. in Proc. Linn. Soc. N.S.W. XXXI (1906) 303, t. 23 (Basionym).

E. acmenioides Schau. var. *carnea* (R. T. Bak.) Maiden, Crit. Rev. Gen. Euc. I (1907) 265, 266.

Ssp. *carnea* is widespread in the North Coast division of New South Wales, usually on poor stony soils on hillsides, in dry sclerophyll forest. It is not found on poor sandstone or other sandy soils. The southern limit is near Wyong where there is intergradation with ssp. *umbra*. Much Queensland material is similar to ssp. *carnea* but the populations there require further study.

E. acmenioides Schau. is distinct on the whole from *E. umbra*, although it is undoubtedly very closely related. The use of the name *E. triantha* Link for this species is quite incorrect, for the reasons given by Blake (l.c.).

E. eugenioides *Sieb. ex Spreng.*, Syst. Veg., Cur. Post. IV (1827) 193, non auct. post.

E. acervula Sieb. ex DC., Prodr. III (1828) 217 (non *E. acervula* Hook. f., 1860, nom. illegit.).

E. wilkinsoniana R. T. Bak. in Proc. Linn. Soc. N.S.W., XXV (1900) 678.

E. wiburdii Blakely, Key Euc. (1934) 187 ("*Wiburdi*").

E. laevopinea R. T. Bak. var. *minor* R. T. Bak. in Proc. Linn. Soc. N.S.W. XXIII (1898) 416 (non *E. laevopinea* var. *minor* Maiden, 1920, nom. illegit.).

E. wilkinsoniana var. *crassifructa* Blakely, Key Euc. (1934) 189.

I have carefully examined ISOTYPES of *E. eugenioides* Sieb. ex Spreng. (Sieber, Nov. Holland 479, NSW 54048, flowers, adult and juvenile leaves) and *E. acervula* Sieb. ex DC. (Sieber, Nov. Holland 469, NSW 54049, buds, flowers and adult leaves). These undoubtedly not only represent the same species as each other (as pointed out by Maiden, Crit. Rev. Gen. Euc. I (1907) 233) but, moreover, agree in all details with *E. wilkinsoniana* R. T. Bak. In 1907, Maiden did not distinguish the latter from the common "White Stringybark" to which he later restricted the name *E. eugenioides*. In shape, texture and venation, the leaves of Sieber 479 and 469 are characteristic of the "Thin-leaved Stringybark" (*E. wilkinsoniana*) and differ from those of the "White Stringybark" ("*E. eugenioides*" auct., *E. globoidea* Blakely, "*E. scabra*" sensu Blakely.) The characters of the buds and flowers, though less diagnostic in this case, also agree with this determination.

Thus the name *E. eugenioides* Sieb. ex Spreng. must be used for *E. wilkinsoniana* and not for the White Stringybark, which must be called *E. globoidea* (see below). *E. acervula* was applied by Blakely (1934) chiefly to individuals from the Blaxland and Glenbrook area of the lower Blue Mountains. The populations in this area appear to exhibit signs of hybridisation and introgression involving both *E. eugenioides* s. orig. and *E. oblonga* DC.; Sieber 469 does not suggest this. *E. wiburdii* Blakely represents a local population from near Jenolan Caves, which has rather narrow leaves and small fruits with a depressed disc. I have studied this form in the field and do not consider it to fall outside the normal limits of variation of the widespread species *E. eugenioides* s. orig.

E. globoidea *Blakely* in Journ. Roy. Soc. N.S.W. LXI (1927) 157.

E. yangoura Blakely, Key Euc. (1934) 190.

MISAPPLIED NAMES: "*E. scabra*" sensu Blakely, l.c. 199 pro parte maj., non Dum.-Cours., Bot. Cult. ed. 2, VII (1814) 279.

"*E. eugenioides*" auct. austral. sec. Maiden, Crit. Rev. Gen. Euc. I (1907) 232, pro parte maj., non Sieb. ex Spreng. (1827) (v. supra).

Since *E. eugenioides* Sieb. ex. Spreng. is the species which has been generally known as *E. wilkinsoniana* R. T. Bak., the correct name for "*E. eugenioides*" auct., the "White Stringybark" of coastal New South Wales and eastern Victoria, must now be considered.

Blakely (1934) treated this as two separate species, "*E. scabra*" and *E. globoidea*, on the assumption that *E. scabra* Dum.-Cours. was an earlier name for *E. eugenioides*.

De Candolle (Prodr. III (1827) 217) used *E. scabra*, referring *E. eugenioides* to it as a synonym, but this proves nothing in view of the nature of the material and the inadequate knowledge of *Eucalyptus* at the time. Dumont de Courset (see Maiden, Crit. Rev. Gen. Euc. I (1907) 233 for a copy of the description) described *E. scabra* from an immature cultivated plant which is certainly unidentifiable and the leaf-dimensions of which (5½ cm. broad) suggest that it was most unlikely to be the White Stringybark. *E. scabra* Dum.-Cours. must be regarded as a *species dubium*.

The supposed distinctions between "*E. scabra*" sensu Blakely and *E. globoidea* are quite unreal, depending largely on the number of flowers or fruits which have fallen off from the inflorescences, and specimens of practically identical appearance can be found under both names as determined by Blakely. A few of his "*E. scabra*" specimens represent hybrids with *E. oblonga*. There are certainly not two groups of populations in nature. Likewise *E. yangoura* is not distinguishable from the rest of the material. Blakely compared juvenile foliage at different and non-comparable stages of development.

For the single species represented by these names the correct name is *E. globoidea* Blakely and this should henceforth be used. The species often known in Queensland as "*E. eugenioides*" is distinct. This is *E. phaeotricha* Blakely et McKie, which is also found on the Far North Coast of New South Wales. *E. globoidea* reaches its northern limit near Kempsey. *E. cameronii* Blakely et McKie, which takes its place on the eastern fall of the New England tableland, is closely related but sufficiently distinct to be treated as a species. It is a common species, not rare as Blakely supposed.

The two varieties of *E. globoidea* given by Blakely (1934) may partly represent hybrids. In any case they require further investigation.

E. oblonga *DC.*, Prodr. III (1827) 217; Blakely, Key Euc. (1934) 201.

E. sparsifolia Blakely, Key Euc. (1934) 200 ("*sparsiflora*" in text, "*sparsifolia*" in keys and lists and index, and on specimens labelled by Blakely).

E. oblonga var. *rugulosa* Blakely, l.c. 201.

I have examined an ISOTYPE (Sieber Nov. Holland 583) of *E. oblonga* and am satisfied that it belongs to this species. *E. sparsifolia* cannot be separated from *E. oblonga*. The species is widespread and common throughout much of the Hawkesbury Sandstone region in the Central Coast, Central Tablelands and Upper Hunter Valley districts of New South Wales. There are outliers in the Hastings River district, on the Mullions Range near Orange and on Permian sandstones on the lower Shoalhaven River. The species is found also on other siliceous formations within the general area. A broader-leaved form probably referable to *E. oblonga* is found near Hillgrove, east of Armidale.

The species shows a good deal of local variation in places, as well as extensive hybridisation and introgression involving other stringybark species, especially *E. agglomerata* Maiden, *E. eugenioides* Sieb. ex Spreng. s. orig., *E. globoidea* Blakely and probably *E. capitellata* Sm. *E. deformis* Blakely probably represents the eastern population of *E. oblonga* showing introgression from *E. capitellata*, but this needs more study.

E. sieberi *L. Johnson*, **sp. nov.**

HOLOTYPE: Blackheath, N.S.W., J. H. Maiden 4.1899 (NSW 54047), with buds, fruit, adult and coppice foliage. In order to avoid any ambiguity, the name is based on this new type and description, rather than on Mueller's specimens and description under *E. sieberana*.

MISAPPLIED NAME: *E. sieberana* F. Muell., Eucalyptographia Dec. II (1879) ("*Sieberiana*") nom. illegit., quoad descr. pro parte maj., excl. syn. *E. virgata* Sieb. ex Spreng. et excl. lectotyp.

Arbor elata, mediocris vel parva, nonnunquam ad "mallee" reducta, cortice trunci et saepissime ramorum primariorum duriusculo, fusco, plus minusve longitudinaliter sulcato, sed in arboribus juvenilibus vel parvis plus minusve squamoso et molliore, cortice ramorum secundariorum tertiariorumque laevi alboque vel interdum rubescenti, ligno pallido. Ramuli plerumque pruinosi. Folia juvenilia usque ad 4-5 paria opposita, sessilia vel breviter petiolata, elliptica vel late lanceolata, glauca, coriacea, 8-12 cm. longa, 5-7 cm. lata. Folia intermedia quasi alterna, petiolata, glauca, oblique lato-lanceolata vel lanceolata, circiter 8-16 cm. longa, 5-10 cm. lata. Folia adulta petiolata, viridia, lanceolata vel falcato-lanceolata, venulosa venatione acuta, circiter 9-18 cm. longa, 1·5-2·5 cm. lata. Inflorescentiae axillares, cymoso-umbelliformes plerumque 7- vel 11-florae pedunculis subcompressis 0·5-1·5 cm. longis. Alabastra pedicellata, elongato-clavata, 4·5 mm. lata, operculo simplici, hemisphaerico vel aliquanto depresso-hemisphaerico quam hypanthio breviore. Filamenta alba, multa sterilia; antherae reniformes glandula terminali. Fructus pedicellati, piriformes, truncati, 7-11 mm. longi, 6-8 mm. lati, disco circiter 1 mm. lato, planiusculo vel plano vel oblique depresso, in vivo rubello, capsula plerumque triloculari, valvis parvis, inclusis.

This is the very well-known species which has been called *E. sieberiana* F. Muell. (in corrected form *sieberana*). However, Mueller proposed this as a new name for *E. virgata* Sieb. ex Spreng., which he cited, because he considered " *virgata* " inappropriate. Mueller's figure and his description (for the most part) applied to the present species, which is known as " Black Mountain Ash " in New South Wales, and which occurs also in eastern Victoria and northern Tasmania. The localities which he cited in western Victoria and southern Tasmania must apply to other species. Mueller did comment on certain discrepancies between the characters given in his own description and those in the original description of *E. virgata* Sieb. ex Spreng., nevertheless it is clear from his treatment in the protologue that he proposed *E. sieberana* as a new name to replace *E. virgata*, not as an independent new species. Thus under Article 63 of the International Code of Botanical Nomenclature (1961) his name is illegitimate. Many taxonomists now agree that this Article is unfortunate and unnecessary, nonetheless it exists, and its abandonment at this stage would result in reversals of established name-changes in many cases. In accordance with this interpretation of Mueller's intentions and to settle the typification, I select the type of *E. virgata* (see below) as Lectotype of *E. sieberana* F. Muell.

E. virgata Sieb. ex Spreng., of which I have seen an Isotype (Sieber, Nov. Holland 467, NSW 26896), undoubtedly represents the occasional hybrids between *E. luehmanniana* F. Muell. and either *E. obtusiflora* DC. or *E. stricta* Sieb. ex Spreng. s. str. Blakely (1934) misapplied the name *E. virgata* to *E. luehmanniana* itself, and earlier authors had used it for *E. sieberi* and members of the *E. stricta* complex. The " Yellow-topped Mallee-ash " must now be called *E. luehmanniana*, not *E. virgata.*

Though the necessary re-naming of the " Black Mountain Ash " will cause inconvenience, it is hoped that this will be minimised by the minor nature of the change from " *sieberiana* " to " *sieberi* ".

E. multicaulis Blakely (1927) is a species of constant mallee habit even when unburnt, very closely allied to *E. sieberi;* it is not the same as the reduced mallee-form individuals of the latter often found in much-burnt sites under poor conditions, and at present I consider it specifically distinct. A fair-sized stand may be seen near Faulconbridge on the lower Blue Mountains, though I have not been able to find it in the type locality near Kariong Trig., west of Woy Woy. Stands of *E. multicaulis* occur also near Heathcote and (in a rather broad-leaved form) east of Mt. Coricudgy and Mt. Monundilla, between Rylstone and Howe's Valley. It should be remembered that if it were considered conspecific with the much more widespread and important *E. sieberi*, the earlier name *E. multicaulis* would have to be used for the whole.

A New Species of the *Acacia decurrens* Group from New South Wales

By Mary D. Tindale

Acacia parramattensis *Tindale*, **sp. nov.**

Frutex vel arbor 2-14 m. alta, cortice truncorum et ramorum levi, praeter in arboribus vetustis basim versus corrugata, nigra, atrobrunnea vel viridi. Ramuli vix costati, brunnei, atrobrunnei vel virides, pilis brevibus, appressis, griseis vel albis vestiti, basim versus prope glabri, numquam tomentosi, haud glauci. Ramuli novelli flavi. Folia: petiolus 1·2-3 cm. longus, apicem versus glandula glabra vel sparse pubescenti, vix depresso-spherica vel vix depresso-oblonga ornatus; rhachis 3·5-11 cm. longa, ut ramuli vestita, in plano verticulo parce applanata, prope basim omnis pinnae glandula vix depresso-spherica vel vix depresso-oblonga praedita, etiam glandulis 1 vel raro 2, parvis, interjugalibus, vix depresso-sphericis vel vix depresso-oblongis, non contiguis ornata. Pinnae 6-14- (saepissime 8-12-) jugae, 2·5-6 cm. longae, 5-14 mm. latae, atrovirides. Foliola 20-33- (raro- 40) juga, cultrata vel linearia, 2·5-7 (saepissime 3-5) mm. longa, 0·5-1 mm. lata, margine et nonnumquam subtus pilis patentibus vel appressis, albis parce vestita, supra glabra, apice obtusa vel subacuta, basi oblique rotundata. Capitula flava, globosa, in racemis vel paniculis disposita, floribus saepissime 25-30, pedunculis pilis brevibus, appressis, flavis sparse vestitis. Bracteolae circiter 0·8 mm. longae, brunneae, spathulatae vel peltatae, sursum dilatatae, ciliolatae et curvatae, anguste petiolatae. Calyx 0·7-0·8 mm. longus, obconicus, breviter quinquelobatus, parce angulatus, costis tubi ciliolatis, lobis obtusis apicem versus ciliolatis. Corolla circiter 1·5 mm. longa, profunde quinquelobata, lobis acutis, anguste lanceolatis, glabris, praeter margines loborum minutissime granulosos. Staminum filamenta numerosa, circiter 2·5-3 mm. longa. Antherae biloculares. Ovarium subsessile, glabrum, oblongum, apicem versus parce dilatatum, 0·5-0·6 mm. longum. Stylus glaber, circiter 3 mm. longus. Legumina stipitata, coriacea, 6-11 cm. longa, 3·5-7·5 mm. lata, nigra vel brunnea, submoniliformia, pilis brevibus, albis, appressis vestita, denique fere glabra. Semina nigra, nitida, oblongo-elliptica, parum compressa, in legumine longitudinaliter disposita, funiculo primum filiformi deinde in arillum pileiformem super seminis apicem incrassato, areolo vix prominente.

Holotype: Railway Parade, Hazelbrook, Blue Mountains, 2,210 ft. alt., tree 20 ft. high, in a dense stand, trunk smooth, greenish-black, corrugated near the base, in full flower and with mature fruit, M. Tindale 2.1.1960 (NSW 48984), located in the National Herbarium of New South Wales, Sydney, Australia. Isotypes: K; US; L.

Distribution: Central Coast and Central Tablelands of New South Wales, Australia, extending less frequently to the South Coast and Southern Tablelands of New South Wales as well as to the Australian Capital Territory. This species is very common in the Blue Mountains and in the Penrith-Wiseman's Ferry district.

Representative Specimens: ½ mile S of the Maroota turnoff to McGrath's Hill, tree 25 ft. high, in dry sclerophyll forest, shale, Tindale 10.1960 (NSW 52504); 1 mile S of Richmond, tree 20 ft. high, smooth greenish-black bark, shale, flowering almost over, along roadside, at edge of pasture, fruiting heavily, alt. 15 m., Tindale 1.1960 (NSW 48986); St. Helena, 4 miles S of Springwood, tall spreading tree 30 ft. high, bark smooth, basalt, alt. 1,350 ft., Constable 11.1960 (NSW 53747); Bearambing, 3 miles NW of Bilpin, small tree 15 ft. high, smooth bark, locally frequent, gravelly clay, Constable 11.1960 (NSW 52965); on Hume Highway, 5 miles north of Marulan, large tree 40 ft. high, 9 inches d.b.h., smooth bark, Sherry No 4, 10.1957 (NSW 47262); Barber's Creek, Maiden 12.1897 (NSW 34433).

Chromosome Number: $n = 13$ (B.G. Briggs, personal communication, previously unpublished). This count was made by Dr. Briggs on material collected at Hazelbrook by M. Tindale, 6.2.1960 (Voucher Specimen NSW 49418).

Acacia parramattensis occurs in dry sclerophyll forest chiefly on shale but occasionally on other formations. The main flowering period ranges from late November to early February, although in rare cases flowering may continue until April. Mature legumes are borne on the trees from November till early February, after a ripening period of about 12 months.

This new species is most closely allied to *Acacia mearnsii* De Wild. which is common on the Central and Southern Tablelands, the South Coast and rarely in a few localities on the Central Coast of New South Wales extending to Victoria and Tasmania. *A. mearnsii* has a slightly earlier flowering period i.e. from October until December but mainly in November. In *A. mearnsii* the stems are velvety-pubescent whereas they are glabrous or sparsely clothed with short, appressed hairs in *A. parramattensis.* In the latter species the pinnules are broadly rounded or subacute, 2·5 to 7 (mainly 3 to 5) mm. long and glabrous except sparsely ciliate along the margins; each pinna consisting of 20 to 33 pairs of pinnules (rarely up to 40 pairs in the uppermost pinnae). However in *A. mearnsii* the pinnules are always broadly rounded, 1·2 to 3 mm. long, glabrous above, densely pubescent below and ciliate along the margins: each pinna consists of 30 to 44 pairs of pinnules. There are 6 to 14 (usually 8 to 12) pairs of pinnae in *A. parramattensis* but 9 to 20 pairs in *A. mearnsii.* The legumes of *A. parramattensis* are slightly narrower than those of *A. mearnsii*, also the glands of the leaf-rhachides and the peduncles of the inflorescences in *A. parramattensis* are glabrous or slightly pubescent, whereas they are densely tomentose in the other species.

On the lower slopes of the Blue Mountains *A. parramattensis* often grows near *A. parvipinnula* Tindale but I have observed no hybrids between them, although the flowering periods of these two species overlap to a slight extent.

ACKNOWLEDGEMENT

I wish to thank Dr. Barbara G. Briggs for her kind permission to allow me to publish the chromosome count which she made for material of *A. parramattensis*.

The New South Wales Species of *Darwinia*

BARBARA G. BRIGGS

The species of *Darwinia* (Myrtaceae—Chamelaucieae) occurring in New South Wales are almost entirely restricted to that State. They are closely allied to one another and show considerable morphological similarity as well as uniformity of chromosome number and some instances of interfertility. Such close affinity is not apparent between any of these species and those of other Australian States. The latter total about 32, of which the great majority occur in Western Australia, and show a variety of vegetative and floral structures as well as a range of aneuploid chromosome numbers (Smith-White, 1954).

As pointed out by Smith-White (l.c.) there is need for a reappraisal of the limits of *Darwinia* and allied genera, based on both morphological and cytological evidence, but such a comprehensive treatment is outside the scope of the present study. The group considered here includes *D. fascicularis*, the type species of the genus. Therefore any future division of the genus would not affect the generic name of these species and their taxonomy may be considered without prior evaluation of generic limits.

In this group, Bentham (1867) recognised only the species *D. fascicularis* and *D. taxifolia*, and described a new variety under the latter. Subsequently Cheel (1922) recognised six taxa, three being of varietal rank. Some of these taxa were placed in an inappropriate rank or were not adequately typified and there are, in addition, a number of taxa which have not previously been described.

CHROMOSOME NUMBER: Studies made in the course of this work indicat that a haploid number of six is common to all the members of the *D. fasciculari* group. These observations are in agreement with the findings of Smith-Whit (1950,1954) and provide cytological data for several species not previously counted The count voucher specimens are indicated in the lists of specimens examined

INTERSPECIFIC HYBRIDIZATION: The present investigation has been combined with a study of interspecific hybridization which will be reported separately. All known cases of natural hybridization involve *D. fascicularis*, which interbreeds with *D. grandiflora*, *D. glaucophylla* and *D. procera* forming extensive swarms of highly fertile hybrids, and which produces occasional hybrids with *D. diminuta*. Collections of such intermediates are cited in the treatment of *D. fascicularis*. No hybrids have been found, however, where this species occurs in mixed stands with *D. biflora* or *D. leptantha*. Likewise mixed stands of *D. grandiflora* with *D. diminuta* or o *D. leptantha* with *D. camptostylis* show no evidence of hybridism. Among these species the ability to hybridize under natural conditions is controlled by features of the breeding system and by incompatibility reactions, neither of which is correlated with the probable affinities of the species.

BREEDING SYSTEMS: Observations on the mode of pollination in *D. fascicularis* have been presented by Brewster (1915). The following observations are supported by experimental data which will be presented elsewhere: In all species the pollen, suspended in an oily liquid, is extruded from the anthers on to the stylar hairs. In *D. fascicularis*, *D. taxifolia* ssp. *macrolaena*, *D. grandiflora*, *D. glaucophylla* and

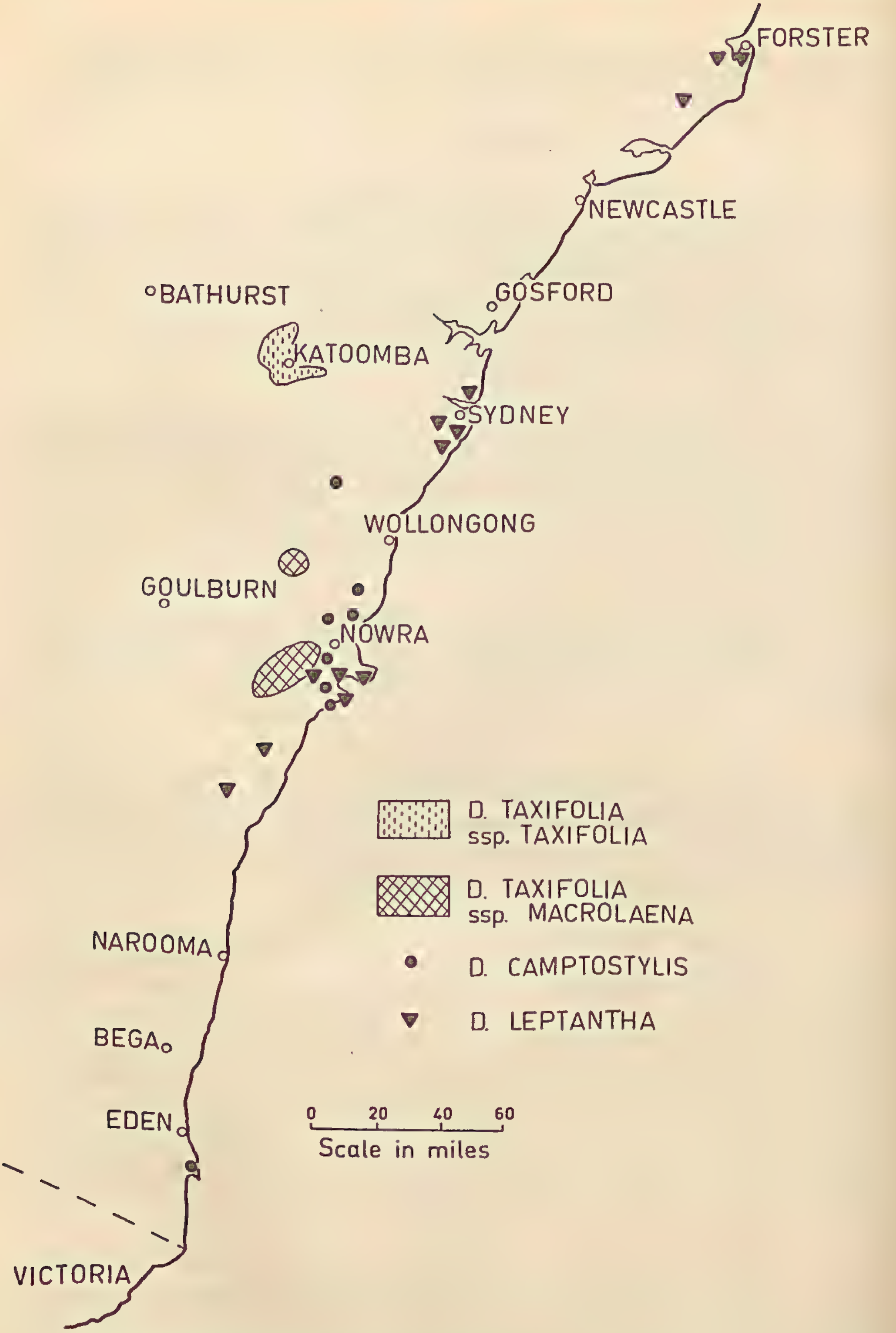


Fig. 1. South-eastern New South Wales showing the distribution of *D. taxifolia*, *D. camptostylis* and *D. leptantha*. A single collection of *D. camptostylis* from East Gippsland, Victoria, has been omitted as its precise locality is not known, and the occurrence of *D. leptantha* at Diamond Head, 30 miles N of Forster, is also not shown.

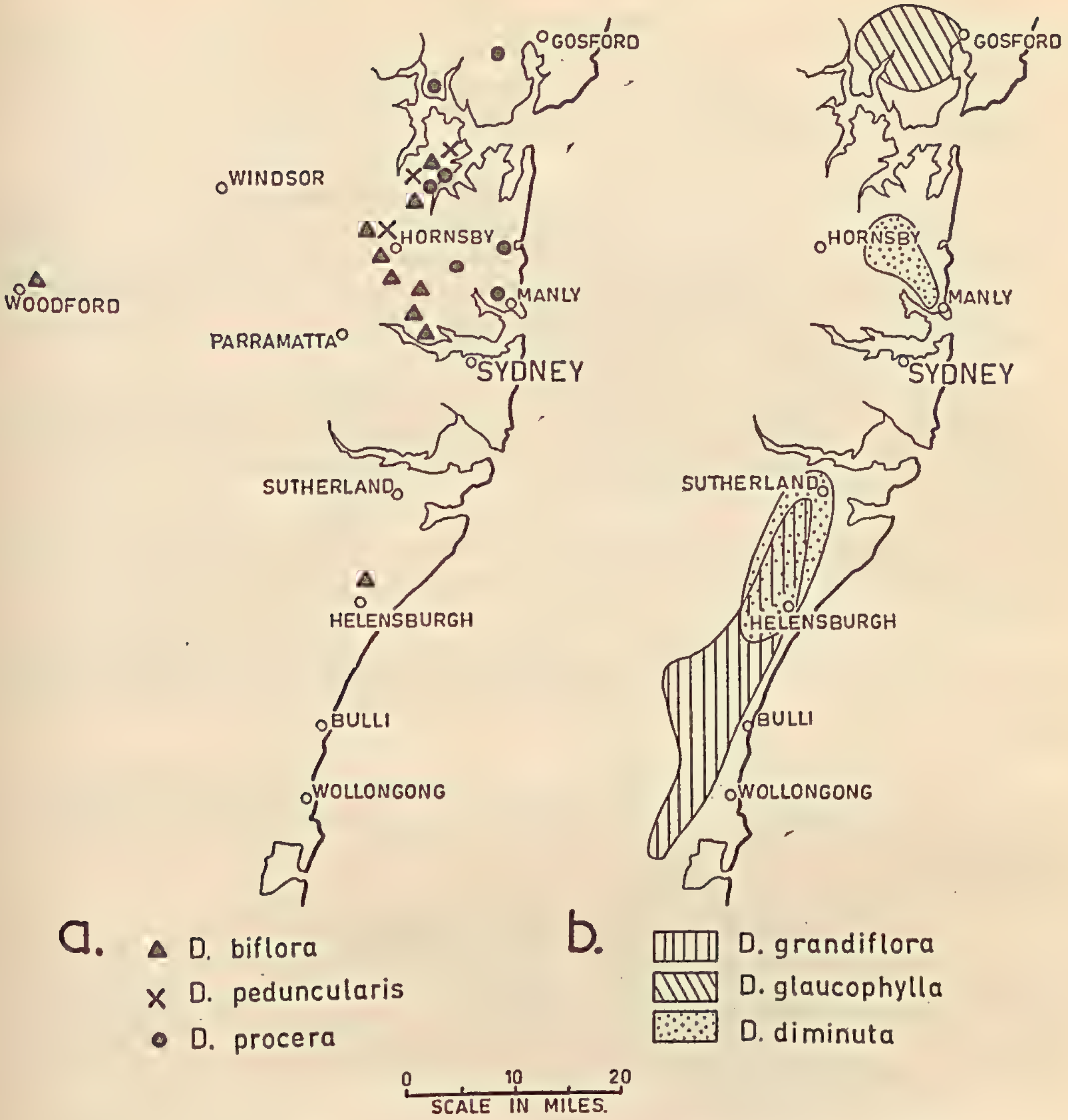


Fig. 2. Distribution of six species of *Darwinia*.

D. procera some vector is required to transfer the pollen from the stylar hairs to the stigma and a considerable proportion of outbreeding may occur. Self-pollination before flower opening is usual in *D. diminuta*, *D. camptostylis*, *D. leptantha* and *D. biflora* in which the stylar hairs are close to the stigma and both structures are covered by the pollen mass. The small, inconspicuous flowers of these species are rarely visited by insects and outcrossing, although not entirely excluded, is probably a rare occurrence. It appears that the basic floral structure of *Darwinia* is associated with the promotion of outcrossing and that regular self-pollination is a derived condition. The species which are predominantly inbred seem to be more closely allied to various outcrossing species than to each other and the necessary change in the proportions of the floral parts may have occurred several times within the group. A low frequency of outbreeding may occur in *D. taxifolia* ssp. *taxifolia* and *D. peduncularis* in which the stigma is sometimes, but not always, covered by the pollen mass.

Most species have an extended flowering season which reaches a peak between September and November. There is little flowering during the months January, February and March, but flowers are produced intermittently at other times. An exception is *D. peduncularis* in which flowering is almost entirely confined to a few weeks in mid-spring.

RELATIONSHIPS WITHIN THE GROUP: There is no evidence of gross chromosomal differentiation or of hybrid sterility among these species. Moreover, a complex pattern of non-reciprocal incompatibility has been found in certain interspecific crosses, with the result that interfertility cannot be used here as a clear indication of close relationship. The following groupings of species are therefore suggested entirely on the basis of morphological similarity:

a. *D. grandiflora*, *D. diminuta* and *D. taxifolia.* These species show prominently ridged and usually papillate ovaries as well as relatively long calyx lobes (Fig. 4). In these and other floral features *D. grandiflora* and *D. diminuta* are more similar to one another than to *D. taxifolia.*

b. *D. peduncularis*, *D. procera* and *D. biflora* are similar in their small calyx lobes, smooth and broadly ridged ovaries and broad bracteoles of relatively rigid texture.

D. camptostylis, *D. leptantha* and *D. glaucophylla* may be allied to the preceding three species but it is difficult to suggest their affinities. They do not appear to be particularly closely allied to one another.

c. *D. fascicularis.* The almost terete and usually multi-seriate leaves of this species are distinctive but are presumably derived from the triquetrous form and regularly opposite arrangement which is found in the other members of the group.

DISTRIBUTION: The distribution of the species is shown in Figs. 1 to 3 and is mentioned under each taxon. The maps give the general pattern of distribution but do not show minor disjunctions associated with local ecological conditions. The distributions refer to localities within New South Wales unless otherwise indicated; the only known occurrence outside this State is a single collection of *D. camptostylis* from Victoria.

Most of the taxa tend to be locally abundant in small, disjunct areas. Destruction of populations by fire may have been a factor in producing some of these minor disjunctions since *Darwinia*, unlike most sclerophyllous genera of the Australian flora, shows little regeneration after fire.

Distinct edaphic requirements are apparent among the species. Thus *D. biflora* is characteristically found on Wianamatta shale and laterite areas from which the other taxa are almost entirely excluded. *D. fascicularis*, *D. glaucophylla* and *D. diminuta* occur on shallow soils whereas *D. grandiflora*, *D. camptostylis* and *D. leptantha* occur on deeper, poorly drained sandy soils. Such apparent differences in ecological adaptation do not fully account for the distribution pattern of the taxa. For example there are many situations apparently suitable for *D. procera*, *D. glaucophylla* and *D. peduncularis* south of the areas in which these species have been found. Another case is the distribution of the two subspecies of *D. taxifolia*, which appear to be very similar in their ecological requirements. Their known ranges are separated by about 100 miles, although the intervening areas include many localities which appear to be suitable for their growth.

A feature of the distribution is the overlap of the ranges of species that are apparently closely allied. *D. grandiflora* and *D. diminuta* coexist over a considerable area in the Helensburgh district, where *D. grandiflora* predominates in the deeper soils. However the differences in ecological requirements are too slight to prevent the frequent occurrence of mixed stands. The general distribution ranges of *D. peduncularis* and *D. procera* also overlap extensively but, in this case, the species occur in discontinuous stands and are not known to occur together, even though no constant difference has been observed between the habitats they occupy. In such cases it is difficult to envisage the conditions of habitat and of population isolation which prevailed during the genetic divergence of the members of the group.

It is even more difficult to account for the coexistence of species which form natural hybrids. The entire range of *D. glaucophylla* is overlapped by that of *D. fascicularis* ssp. *fascicularis* and the ecological requirements of the taxa appear to be very similar, both occurring predominantly in shallow soil at the edges of sandstone exposures. As a result no extensive stands of *D. glaucophylla* are known which are remote from *D. fascicularis* and free from hybridization with that species. Nevertheless the former species has retained a most distinctive combination of morphological features and plants showing no *D. fascicularis* influence are usually much more common than the obvious hybrids. The nature of the isolating mechanisms maintaining this situation remains unexplained. It should be noted that *D. glaucophylla* has a much more restricted geographical range than *D. fascicularis* and that the two species differ considerably in habit and therefore may occupy slightly different niches in the habitat.

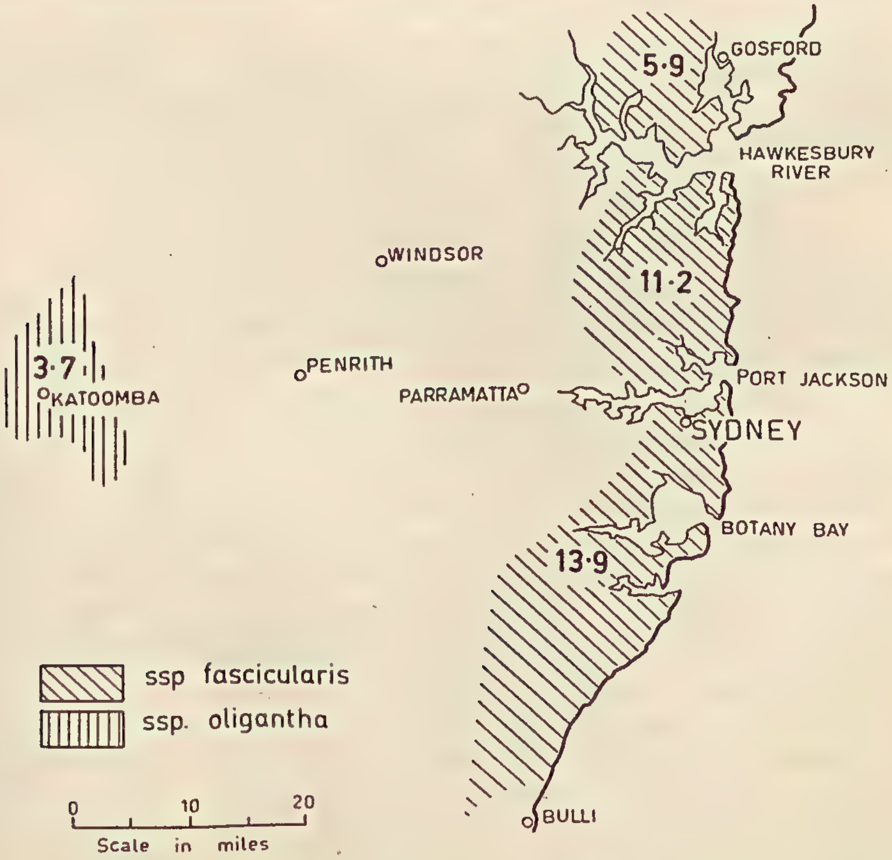


Fig. 3. Distribution of *D. fascicularis*. Mean values of the number of flowers per cluster are shown for the discontinuous regions of the distribution area. The values for ssp. *fascicularis* were obtained by averaging, within each region, the local population samples shown in Fig. 6.

Similarly, *D. fascicularis* overlaps the entire range of *D. procera* and much of that of *D. grandiflora* and forms hybrid swarms with both species. In these cases there are slight ecological differences which restrict the extent of mixed stands and some apparently pure stands of *D. procera* and *D. grandiflora* are known.

DESCRIPTIVE TERMINOLOGY:

Peduncle: There is evidence of considerable inflorescence reduction in the Myrtaceae (L. A. S. Johnson, pers. comm.). In *Darwinia* the unit inflorescences, each representing a reduced dichasium, consist of a single flower accompanied by a pair of bracteoles. These unit inflorescences are grouped in a terminal cluster. In view of the compound nature of the inflorescence, the axis below the bracteoles is described as the peduncle, although other authors have referred to it as a pedicel.

Calyx lobes and petals: These terms are used following common practice and are not intended to express an opinion as to the morphological nature of the floral tube.

Floral tube: The length given includes the section adnate to the ovary.

Anthers: The description of colour applies to the appearance shortly before dehiscence; subsequently the anthers darken and shrivel.

CITATION OF SPECIMENS. All the type specimens cited have been examined except where otherwise indicated. The abbreviations cited for herbaria are those given by Lanjouw and Stafleu (1959) except TECH which refers to the Museum of Applied Arts and Sciences, Sydney.

MORPHOLOGICAL FEATURES OF THE *D. fascicularis* GROUP

Glabrous shrubs, erect, decumbent or prostrate and rooting. Young stems with conspicuous leaf scars, older stems with flaky bark. Leaves decussate or whorled, shortly petiolate, triangular in transverse section with the adaxial surface linear and the abaxial surface keeled, or the three angles less prominently developed so that the leaf is ovate to circular in section. Flower clusters terminal, at least at first, sometimes reduced to 2 flowers (or rarely 1), the stem apex often growing on after flowering. Bracts similar to the leaves or small and scarious, not imbricate, each subtending a flower. Bracteoles concave, keeled. Floral tube ± cylindrical; the lower adnate part with 5 obscure or prominent longitudinal ridges (often more conspicuous in fruit), smooth or papillate between the ridges, becoming slightly enlarged and hardened in fruit; the upper free part petaloid in texture, similar in colour to the perianth lobes, smooth or longitudinally ridged, usually separating from the lower part when the fruit is mature. Calyx lobes 5, petaloid, usually deltoid, entire or dentate. Petals 5, ± ovate, entire. Stamens 10, those opposite the petals uppermost; filaments linear, incurved; anthers globular, dehiscing by pores, the connective slightly expanded. Staminodes 10, alternating with the stamens, attached close to the petaline stamens, linear, as long as the filaments. Style elongating greatly at anthesis, extending beyond the perianth, bearing a narrow ring or lateral tuft of hairs close to the stigma. Ovules 2. Seed solitary, the slender hypocotyl and minute cotyledons in a groove at the end of the large ovoid radicle, the testa very thin and membranous. Seedling cotyledons linear. Juvenile leaves similar to adult foliage. Chromosome number: $n = 6$.

No single character has been found to differentiate the *D. fascicularis* group from all other species of *Darwinia*. The combination of the following characters is, however, distinctive within the genus: leaves linear-triquetrous without flattened lateral margins; bracts narrow, not consistently differentiated from the foliage leaves; stylar hairs forming a narrow band or lateral tuft; ovules regularly 2; ovary glabrous, without rings of glandular papillae.

The relative proportions of the calyx lobes and petals were among the characters used by Bentham (1867) in delimiting sections within *Darwinia*. It appears that undue emphasis has been placed upon this feature and the *D. fascicularis* group includes species with calyx lobes similar in length to the petals (*D. grandiflora* and *D. diminuta*) as well as those with short calyx lobes (e.g. *D. fascicularis*).

Figures 4 and 5 illustrate some of the principal morphological features of the species.

1. Leaves laterally compressed, the abaxial surface keeled. Flower clusters of (1-) 2-6 (-8) flowers.

2. Bracteoles extending beyond the perianth, persisting until after anthesis. Style recurved .... *D. taxifolia* 1.

2.* Bracteoles not extending beyond the perianth, either caducous or persisting until after anthesis. Style straight or bent antrorsely.

3. Calyx lobes more than ¾ of petal length. Ovary papillate between the longitudinal ridges.

4. Floral tubes 7-12 mm. long. Petals becoming dark red. Style 12-20 mm. long. Main stems prostrate and rooting, with ascending lateral branches .... *D. grandiflora* 2.

4.* Floral tubes 3-5 mm. long. Petals white or pink. Style 4-9 mm. long. Erect or ascending shrub .... *D. diminuta* 3.

3.* Calyx lobes less than ¾ of petal length. Ovary not papillate, except rarely in *D. leptantha*.

5. Flowers (including style), 4-9 mm. long. Bracteoles yellow-green or yellow-brown. Perianth of young flowers white or cream.

6. Ovary 1-1·5 mm. diam. in flower, 1.5-2 mm. diam. in fruit. Bracteoles persisting until after anthesis, more than 2/3 of length of floral tube .... *D. camptostylis* 4.

6.* Ovary 0·4-0·6 mm. diam. in flower, 0·5-0·7 mm. diam. in fruit. Bracteoles caducous, mostly less than 2/3 of length of floral tube .... *D. leptantha* 5.

5.* Flowers (including style), 9-25 mm. long. Bracteoles dark brown or red-purple. Perianth of young flowers white or green.

7. Ovary 0·6-1·3 mm. diam., with distinct narrow longitudinal ridges. Erect or prostrate shrub, to 80 cm. high.

8. Main stems prostrate, to 250 cm. long, with ascending lateral branches 2-15 cm. high. Leaves glaucous. Bracteoles caducous .... *D. glaucophylla* 6.

8.* Erect shrub 30-80 cm. high, not glaucous. Bracteoles persisting until after anthesis .... *D. biflora* 7.

7.* Ovary 1·5-2·5 mm. diam., the longitudinal ridges obscure or broad and rounded. Erect shrub 60-300 cm. high.

9. Flower clusters of (1-) 2 (-4) flowers. Peduncles 4-7 mm. long. Style 6-10 mm. long .... *D. peduncularis* 8.

9.* Flower clusters of 4-6 (-8) flowers. Peduncles 1-2 mm. long. Style 14-20 mm. long .... *D. procera* 9.

1.* Leaves terete to semi-terete, the abaxial surface rounded. Flower clusters of 2-20 flowers .... *D. fascicularis* 10.

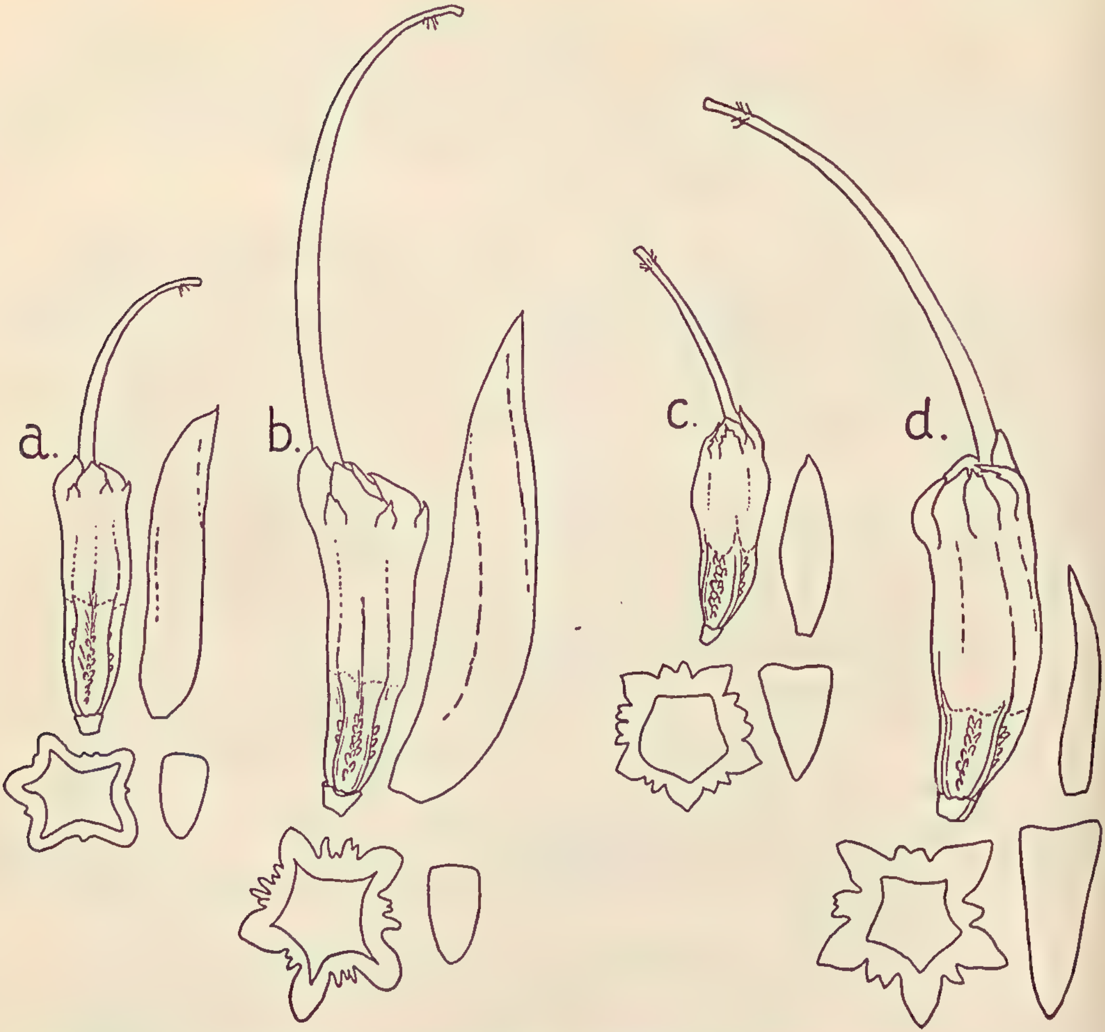


Fig. 4. (a) *D. taxifolia* ssp. *taxifolia*, (b) *D. taxifolia* ssp. *macrolaena*, (c) *D. diminuta*, (d) *D. grandiflora*. Each taxon is represented by the following:

upper left—flower with attached peduncle, placed with the inflorescence axis on the left (× 4).
upper right—bracteole, lateral view (× 4).
lower left—transverse section of ovary, contents omitted (× 12).
lower right—transverse section of leaf (× 12).

1. D. taxifolia *A. Cunn.* in Field, Geogr. Mem. N.S.W. (1825) 325.

Holotype: Rocky declivities on the Blue Mountains, A. Cunningham, 5.10.1822 (K). Not examined by me, reported upon by Dr. R. Melville. This specimen may be regarded as the holotype although the possibility of duplicates existing in other herbaria has not been excluded.

Erect or decumbent shrub, 15-100 cm. high. Leaves decussate, triangular in transverse section, 5-12 mm. long, 0·3-0·7 mm. laterally, 0·8-1·3 mm. dorsiventrally. Flowers 2-4 (-6) in the cluster, arranged in pairs. Peduncles 0·3-1 mm. long. Bracts 3-8 mm. long, similar to the leaves or rarely caducous, deltoid and scarious. Bracteoles deciduous after anthesis, pink or purple-red, oblong or lanceolate, acute or apiculate, 5-14 mm. long. Floral tube 5-9 mm. long, pale pink to dark purple-red above the ovary; ovary 0·8-2·0 mm. diam., usually papillate between the acute longitudinal ridges. Calyx lobes deltoid, entire or dentate, 0·2-1 mm. long. Petals reniform or broad ovate, 1-2 mm. long, incurved forming the oblique floral apex. Anthers dark red-brown. Style red, recurved, 6-24 mm. long, bearing a tuft of hairs on the abaxial side. Fruit 1·2-2·2 mm. diam. Chromosome number: n = 6 (both subspecies).

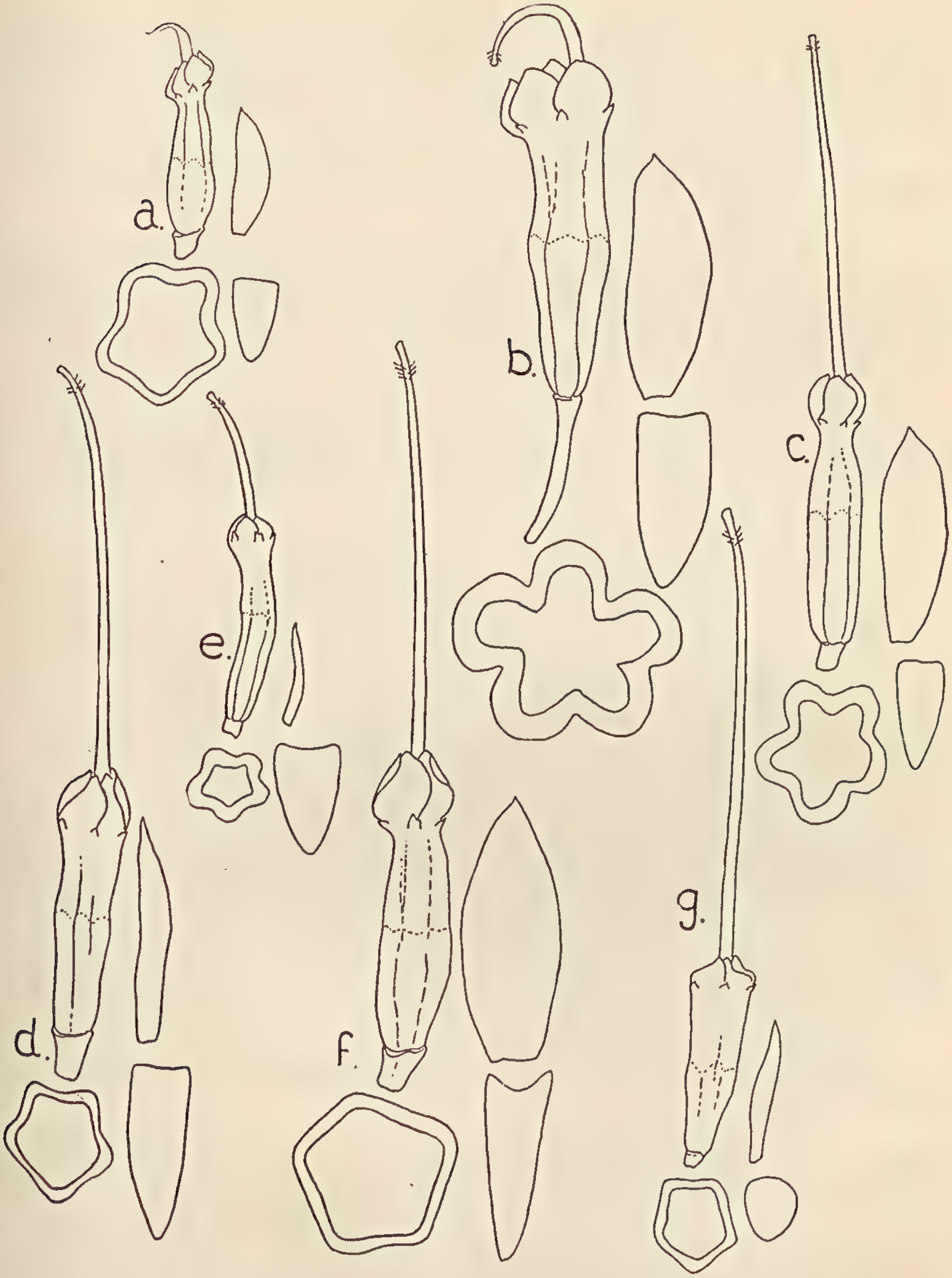


Fig. 5. (a) *D. camptostylis*, (b) *D. peduncularis*, (c) *D. biflora*, (d) *D. glaucophylla*, (e) *D. leptantha*, (f) *D. procera*, (g) *D. fascicularis* ssp. *fascicularis*. Features shown as in Fig. 4.

Schauer, Myrt. Xeroc. II (1840) 190, used the name *D. laxifolia* for this taxon, on the assumption that a typographical error had been made in the original publication. However, the epithet is spelled "*taxifolia*" in Cunningham's manuscript and field label.

Bentham, Fl. Austral. III (1867) 12 included *D. grandiflora* (as a variety) and *D. leptantha* in his concept of *D. taxifolia*. This was followed by Maiden and Betche, Census N.S.W. Pl. (1916) 157. Wide limits to *D. taxifolia* were also set by Moore and Betche, Handb. Fl. N.S.W. (1893) 190 and by Baker and Smith in Journ. Roy. Soc. N.S.W. XXXIII (1899) 164.

References to the occurrence of this species in Victoria by F. Mueller, Fragm. Phytogr. Austral. IX (1875) 176 and by Ewart, Fl. Vict. (1931) 875, appear to have been based on material of *D. camptostylis*.

The species includes two geographic races for which sub-specific rank is appropriate. The populations occurring on the Blue Mountains are geographically separated from those further South on the Coast and Tablelands and differ from them in the smaller size of all floral parts. These differences are maintained in cultivation under identical conditions.

1 Bracteoles 5-8 mm. long. Floral tube 5-6 mm. long. Style 6-12 mm. long .. ssp. *taxifolia*.

1* Bracteoles 7-14 mm. long. Floral tube 6-9 mm. long. Style 15-24 mm. long .... ssp. *macrolaena*.

a. ssp. taxifolia.

D. taxifolia A. Cunn. var. *typica* Cheel in Journ. Roy. Soc. N.S.W. LVI (1922) 72.

Bracteoles 5-8 mm. long. Floral tube 5-6 mm. long. Calyx lobes 0·2-0·8 mm. long. Petals 1·0-1·6 mm. long. Style 6-12 mm. long. Fig. 4a.

DISTRIBUTION: Central Tablelands, from Mt. Wilson to Katoomba. On shallow soil over sandstone, in gully and ridge situations, above 3,000 ft. alt. Fig. 1.

References by Cheel (l.c.) to occurrences on the South Coast apply to *D. leptantha*.

SPECIMENS EXAMINED: Mt. Wilson, Gregson 12.1897 (NSW 51956); Hat Hill, Blackheath, Constable 11.1953 (NSW 26606); Blackheath, Constable 11.1946 (NSW 3727), 2.1948 (NSW 5280), 1.1950 (NSW 11067); Blackheath, Cambage No. 1208, 12.1904 (NSW 51957, SYD); Blackheath, Sayce 1.1930 (NSW 51958); Blackheath, Evans 2.1927 (SYD), 1.1928 (SYD); Fort Rock Road, Blackheath, Constable 10.1957 (NSW 42369); Blackheath, Chapman 11.1909 (SYD); Mt. Blackheath, 3 miles W of Blackheath, Constable 10.1959 (NSW 48659); Wall's Ledge, Blackheath, Briggs 7.1958 (SYD), chromosome count voucher; Wall's Cave, Blackheath, Briggs 7.1958 (SYD); Katoomba, Camfield 12.1908 (NSW 51959); Katoomba, Forsyth 12.1899 (NSW 51960); Echo Point, Katoomba, Dixon 1.1904 (NSW 51961); Leura, Fletcher 10.1914 (NSW 51962); Leura, Carolin 10.1956 (SYD).

Cytological studies on this subspecies were reported by Smith-White (1950) under the name *D. taxifolia* A. Cunn. sensu stricto.

b. ssp. macrolaena *B. Briggs*, subsp. nov.

HOLOTYPE: 6 miles W of Sassafras, B. G. Briggs 7.11.1959 (NSW 51967).

A subspecie typica bracteolis 7-14 mm. longis, tubo florali 6-9 mm. longo, lobis calcycis 0·5-1 mm. longis, petalis 1·5-2 mm. longis, stylo 15-24 mm. longo differt.

Differing from ssp. *taxifolia* in the bracteoles 7-14 mm. long, floral tube 6-9 mm. long, calyx lobes 0·5-1 mm. long, petals 1·5-2 mm. long, style 15-24 mm. long. Fig. 4b.

The name refers to the large bracteoles which cover the floral tube and perianth lobes, from the Greek, makros = long, laina = cloak.

DISTRIBUTION: South Coast and Central and Southern Tablelands, from near Moss Vale to Nowra and Nerriga. On shallow sandy soil, below 2,500 ft. alt. Fig. 1.

SPECIMENS EXAMINED: Sutton Forest, Calvert (MEL); Nowra Hill, Hyam 11.1924 (NSW 51964); Ettrema, 20 miles SW of Nowra, Rodway 12.1946 (NSW 51965); Sassafras, Sturgess 10.1945 (NSW 51966); 9 miles from Nerriga on Tomerong Road, Briggs 10.1958 (SYD), chromosome count voucher; Gunnyenard Mt., Bäuerlen 1.1887 (TECH).

2. D. grandiflora (*Benth.*) *R. T. Bak. et H. G. Sm.* in Journ. Roy. Soc. N.S.W. L (1916) 181.

D. taxifolia A. Cunn. var. *grandiflora* Benth., Fl. Austral. III (1867) 12, BASIONYM; Maiden & Betche, Census N.S.W. Pl. (1916) 157; Cheel in Journ. Roy. Soc. N.S.W. LVI (1922) 73; Smith-White in Proc. Linn. Soc. N.S.W. LXXV (1950) 108.

HOLOTYPE: Illawarra, ex herb. F. Mueller (MEL). There is no duplicate of this collection in K.

The publication of this taxon in specific rank by Baker and Smith was accompanied by citation, description and illustration of specimens of *D. procera* B. Briggs. The authors, however, had misidentified their material as *D. taxifolia* var. *grandiflora* Benth., and cited the latter as a synonym. The effect of this publication was, therefore, to raise this variety to specific rank and *D. grandiflora* must be typified by the material cited by Bentham. As pointed out (in litt.) by Mr. H. K. Airy Shaw of the Kew Herbarium, the typification of this name may be regarded as similar in principle to example f. of Article 55 in the International Code of Botanical Nomenclature (1961).

Bentham's brief description refers only to the length of the calyx lobes and is not diagnostic in specific rank, while the description given by Baker and Smith refers to other material. A new Latin description is therefore given.

Frutex, ramis primariis prostratis radicantibusque ad 2·5 m. longis, ramis lateralibus ascendentibus 5-50 cm. altis. Folia decussata, triangularia in sectione transversa, 8-18 mm. longa, dimensione laterali 0·6-1 mm., dorsiventrali 1-2·2 mm. Flores in fasciculo 4-6, paribus dispositi. Pedunculi 0·5-1 mm. longi. Bracteae 3-16 mm. longae, foliis similes vel caducae deltoideaeque scariosaeque. Bracteolae post anthesin deciduae, flavo-virides vel fulvae, oblongae, acutae vel apiculatae, 4-8 mm. longae. Tubus floralis 7-12 mm. longus, supra ovarium primo albus, mox rubescens; ovarium 1·4-2·0 mm. diametro, inter costas prominentes acutas longitudinales papillatum. Lobi calycis anguste deltoidei, dentati vel raro integri, 1·5-2 mm. longi. Petala late ovata, 1·4-1·8 mm. longa, incurva apicem floralem obliquum formantia. Antherae rubrofuscae. Stylus ruber, 12-20 mm. longus, antrorse curvatus, annulum capillorum ferens. Fructus 1·4-2·4 mm. diametro. Chromosomata gametica 6.

Shrub with the main stems prostrate and rooting, to 2·5 m. long, the lateral branches ascending, 5-50 cm. high. Leaves decussate, triangular in transverse section, 8-18 mm. long, 0·6-1 mm. laterally, 1-2·2 mm. dorsiventrally. Flowers 4-6 in the cluster, arranged in pairs. Peduncles 0·5-1 mm. long. Bracts 3-16 mm. long, similar to the leaves or caducous, deltoid and scarious. Bracteoles deciduous after anthesis, yellow-green or yellow-brown, oblong, acute or apiculate, 4-8 mm. long. Floral tube 7-12 mm. long, at first white above the ovary, soon becoming dark red; ovary 1·4-2·0 mm. diam., papillate between the prominent, acute, longitudinal ridges. Calyx lobes narrow-deltoid, dentate or rarely entire, 1·5-2 mm. long. Petals broad-ovate, 1·4-1·8 mm. long, incurved forming the oblique floral apex. Anthers dark red-brown. Style dark red, 12-20 mm. long, curved antrorsely, bearing a ring of hairs. Fruit 1·4-2·4 mm. diam. Chromosome number: n = 6. Fig. 4d.

DISTRIBUTION: Central Coast, from Waterfall to Dapto, also reported from the northern Sydney suburb of Wahroonga. In heath, scrub and sclerophyll forest, on sandy soils. Fig. 2b.

Cheel's reference to an occurrence at Gosford applies to a specimen of *D. glaucophylla.*

SPECIMENS EXAMINED: Wahroonga, Brough 1922 (SYD), locality doubtful; National Park, Eames & Hotchkiss 9.1953 (NSW 52035); Waterfall, Fraser 8.1934 (NSW 52036); Prince's Highway, S of Helensburgh, Johnson 1.1952 (NSW 52037); 5 miles SSW of Helensburgh, Briggs 2.1961 (NSW 53411); Junction of Darke's Forest Road and Prince's Highway, Briggs 12.1957 (SYD) chromosome count voucher; Prince's Highway, W of Coalcliff, Johnson 1.1952 (NSW 52038); Cataract R., Cheel 3.1907 (NSW 52039); Cataract Dam, Maiden 11.1906 (NSW 52040); Cataract Dam, Maiden & Cambage 11.1906 (SYD); Appin Road, 5 miles from Bulli Pass, Rodway 9.1934 (NSW 52041); Bulli, Brough 10.1934 (SYD); Bulli, Mills 9.1940 (NSW 52042); Mt. Ousley, Briggs 11.1958 (SYD); West Dapto, Cambage No. 415, 6.1901 (NSW 52043).

Cases of application of the name *D. grandiflora* to material of *D. procera* are mentioned under the latter species.

The prostrate habit of this species is unusual in the Myrtaceae and is similar to that of *D. glaucophylla*. The closest relative of *D. grandiflora*, however, appears to be *D. diminuta* which is similar in many floral features.

3. **D. diminuta** *B. Briggs*, **sp. nov.**

HOLOTYPE: 5 miles SSW of Helensburgh, B. G. Briggs 26.2.1961 (NSW 53410).

Frutex erectus vel expansus sed non prostratus, ramis primariis paucis, 15-120 cm. longis, ramis lateralibus multis brevibusque. Folia decussata, triangularia in sectione transversa, 6-11 mm. longa, dimensione laterali 0·3-1·0 mm., dorsiventrali 0·8-1·3 mm. Flores in fasciculo 2-4, paribus dispositi. Pedunculi 0·4-0·6 mm. longi. Bracteae 3-10 mm. longae, foliis similes vel raro caducae deltoideaeque scariosaeque. Bracteolae post anthesin deciduae, flavo-virides, oblongae, acutae vel apiculatae, 3-5 mm. longae. Tubus floralis 3-5 mm. longus, supra ovarium albus, prope apicem interdum rubescens; ovarium 1·0-1·3 mm. diametro, inter costas prominentes acutas longitudinales papillatum. Lobi calycis anguste deltoidei, dentati vel raro integri, 0·8-1·5 mm. longi. Petala late ovata, 0·8-1·2 mm. longa, incurva apicem floralem obliquum formantia. Antherae fulvae. Stylus albus, 5-9 mm. longus, antrorse curvatus, annulum vel penicillum lateralem capillorum ferens. Fructus 1·3-1·7 mm. diametro. Chromosomata gametica 6.

Shrub, erect or spreading but not prostrate, the major branches few, 15-120 cm. long, with numerous short lateral branchlets. Leaves decussate, triangular in transverse section, 6-11 mm. long, 0·3-1·0 mm. laterally, 0·8-1·3 mm. dorsiventrally. Flowers 2-4 in the cluster, arranged in pairs. Peduncles 0·4-0·6 mm. long. Bracts 3-10 mm. long, similar to the leaves or rarely caducous, deltoid and scarious. Bracteoles deciduous after anthesis, yellow-green, oblong, acute or apiculate, 3-5 mm. long. Floral tube 3-5 mm. long, white above the ovary, sometimes becoming red near the apex; ovary 1·0-1·3 mm. diam., papillate between the prominent acute longitudinal ridges. Calyx lobes narrow-deltoid, dentate or rarely entire, 0·8-1·5 mm. long. Petals broad-ovate, 0·8-1·2 mm. long, incurved forming the oblique floral apex. Anthers yellow-brown. Style white, 5-9 mm. long, curved antrorsely, bearing a ring or lateral tuft of hairs. Fruit 1·3-1·7 mm. diam. Chromosome number: $n = 6$. Fig. 4c.

DISTRIBUTION: Central coast, in two areas, from Terrey Hills to Manly and from Sutherland to Bulli. In heath, scrub and sclerophyll forest on poorly-drained sandy soil. Fig. 2b.

Specimens Examined: Tumbledown Dick, Blakely & Shiress 6.1919 (NSW 52030); near Terrey Hills, 5 miles W of Narrabeen, Briggs 1.1961, (NSW 53473); beyond St. Ives, Evans 12.1936 (SYD); 2 miles W of Manly, Briggs 9.1961 (NSW 34385); near Sutherland, St. John No. 24567, 12.1950 (NSW 52031); Loftus, Camfield 1.1894 (NSW 52032); Heathcote, Hamilton 9.1917 (NSW 52033); Heathcote, Vickery & Fraser 11.1933 (SYD); Helensburgh, Briggs 6.1957 (SYD) chromosome count voucher; Prince's Highway, S of Helensburgh, Johnson 1.1952 (NSW 52034).

Studies on this species were reported by Smith-White (1950, 1954) under the names " *D. intermedia* A. Cunn. " and " *D. taxifolia* var. *intermedia* (Cunn.) Cheel " the latter name being a synonym of *D. leptantha*. The former name is a *nomen nudum* as it was not published by Cunningham and an English description only was given by Smith-White.

4. D. camptostylis *B. Briggs*, sp. nov.

Holotype: 4 miles W of Green Cape, E. F. Constable 10.10.1954 (NSW 30103).

Frutex 10-30 cm. altus, erectus vel expansus. Folia decussata, triangularia in sectione transversa, 6-12 (-17) mm. longa, dimensione laterali 0·4-0·8 mm., dorsiventrali 0·8-1·6 mm. Flores in fasciculo 2-4, paribus dispositi. Pedunculi 0·4-0·6 mm. longi. Bracteae 2-12 mm. longae, foliis similes vel raro caducae deltoideaeque scariosaeque. Bracteolae post anthesin deciduae, flavo-virides, oblongae vel lanceolatae, apiculatae, 3·5-6 mm. longae. Tubus floralis 3-6 mm. longus, supra ovarium albus vel aliquantulum flavescens, versus apicem nonnunquam rubescens; ovarium 1·2-1·5 mm. diametro, sine papillis, costis rotundatis longitudinaliter instructum. Lobi calycis deltoidei, integri vel raro dentati, 0·1-0·3 mm. longi. Petala orbiculata vel reniformia, 0·8-1·2 mm. longa, incurva apicem floralem obliquum formantia. Antherae fulvae. Stylus albus, antrorse arcte curvatus, 2·5-5 mm. longus, annulum capillorum ferens. Fructus 1·5-2 mm. diametro. Chromosomata somatica 12.

Shrub 10-30 cm. high, erect or spreading. Leaves decussate, triangular in transverse section, 6-12 (-17) mm. long, 0·4-0·8 mm. laterally, 0·8-1·6 mm. dorsiventrally. Flowers 2-4 in the cluster, arranged in pairs. Peduncles 0·4-0·6 mm. long. Bracts 2-12 mm. long, similar to the leaves or rarely caducous, deltoid and scarious. Bracteoles deciduous after anthesis, yellow-green, oblong or lanceolate, apiculate, 3·5-6 mm. long. Floral tube 3-6 mm. long, white or cream above the ovary, sometimes becoming red toward the apex; ovary 1·2-1·5 mm. diam., not papillate, with rounded longitudinal ridges. Calyx lobes deltoid, entire or rarely dentate, 0·1-0·3 mm. long. Petals orbicular or reniform, 0·8-1·2 mm. long, incurved forming the oblique floral apex. Anthers yellow-brown. Style white, strongly curved antrorsely, 2·5-5 mm. long, bearing a ring of hairs. Fruit 1·5-2 mm. diam. Chromosome number: 2n = 12. Fig. 5a.

Distribution: New South Wales: Central and South Coast, from near Picton to Green Cape. Victoria: East Gippsland. On sandy soils. Fig. 1.

Specimens Examined: New South Wales: Little R., Buxton, Whaite No. 1064, 9.1951 (NSW 52021); N of Minnamurra Falls, Judd 1954 (NSW 52022); Mt. Carrialoo, 5 miles W of Barrengarry Pass, Rodway 8.1946 (NSW 52023); Plateau of Woodhill Bluff, 3 miles N of Berry, Rodway 7.1949 (NSW 52024); near Nowra Hill, Briggs 10.1958 (NSW 52025, SYD); Yerriyong, 8 miles SW of Nowra, Constable 9.1961 (NSW 55889); Parma Creek, 10 miles SW of Nowra, Rodway 7.1935 (NSW 52026); 9 miles W of Tomerong, Briggs 12.1957 (SYD), 6.1958 (NSW 52027); R.A.N. College, Jervis Bay, Rodway 6.1942 (NSW 52028); Green Cape, Briggs 1.1958 (SYD) chromosome count voucher, (NSW 52029). Victoria: East Gippsland, Walter (MEL).

The collection from East Gippsland, Victoria, was misidentified as *Homoranthus virgatus* A. Cunn. by Wakefield in Vict. Nat. LXIX (1952) 84. Wakefield also did not accept the locality given for the specimen; however, in view of the occurrence of *D. camptostylis* in southern New South Wales there seems to be no reason to question the original locality record. The variation between populations in the size of both floral and vegetative parts, is greater in this species than in other taxa of the group.

5. D. leptantha *B. Briggs*, sp. nov.

D. taxifolia A. Cunn. var. *intermedia* Cheel in Proc. Linn. Soc. N.S.W. LVI (1922) 73. Lectotype (here selected): Swamps between Botany Bay and Coogee, E. Betche 16.9.1886 (NSW 52003). This collection is the only one cited by Cheel and marked " type " in his handwriting. *D. leptantha* is not based on this variety.

Holotype: Near Long Bay, Malabar, O. D. Evans 25.11.1960 (NSW 53069).

Frutex 20-80 cm. altus, erectus gracilisque. Folia decussata, triangularia in sectione transversa, 7-11 mm. longa, dimensione laterali 0·3-0·7 mm., dorsiventrali 1·2-2·2 mm. Flores in fasciculo 2-8, conferti et plerumque externa facie irregulariter dispositi. Pedunculi 1-2 mm. longi. Bracteae 1-11 mm. longae, foliis similes vel raro caducae deltoideaeque scariosaeque. Bracteolae caducae, fulvae vel subrubrae, lanceolatae, acutae, 2-3·5 mm. longae. Tubus floralis 4-6 mm. longus, supra ovarium albus, versus apicem interdum rubescens; ovarium 0·4-0·6 mm. diametro, haud vel vix papillosum, costis obtusis longitudinaliter instructum. Lobi calycis deltoidei, integri vel dentati, 0·2-0·4 mm. longi. Petala orbiculata vel ovata, 0·5-1 mm. longa, incurva apicem floralem rotundatum formantia. Antherae fulvae. Stylus albus, rectus vel antrorse curvatus, 4-6·5 mm. longus, annulum capillorum ferens. Fructus 0·5-1 mm. diametro. Chromosomata gametica 6.

Slender, erect shrub, 20-80 cm. high. Leaves decussate, triangular in transverse section, 7-11 mm. long, 0·3-0·7 mm. laterally, 1·2-2·2 mm. dorsiventrally. Flowers 2-8 in the cluster, crowded and usually apparently irregularly arranged. Peduncles 1-2 mm. long. Bracts 1-11 mm. long, similar to the leaves or rarely caducous, deltoid and scarious. Bracteoles caducous, pale yellow-brown or slightly reddish, lanceolate, acute, 2-3·5 mm. long. Floral tube 4-6 mm. long, white above the ovary, sometimes becoming red toward the apex; ovary 0·4-0·6 mm. diam., smooth or rarely slightly papillate, with obtuse longitudinal ridges. Calyx lobes deltoid, entire or dentate, 0·2-0·4 mm. long. Petals orbicular or ovate, 0·5-1 mm. long, incurved forming the rounded floral apex. Anthers yellow-brown. Style white, straight or antrorsely curved, 4-6·5 mm. long, bearing a ring of hairs. Fruit 0·5-1 mm. diam. Chromosome number: $n = 6$. Fig. 5e.

Distribution: Coast districts from near Laurieton to Clyde River. On sandy soils, often in swampy heathland. Fig. 1.

Specimens Examined: Diamond Head, 6 miles S of Laurieton, Burgess 9.1961 (NSW 55883); Forster, James 1957 (SYD); Wallace Is. near Tuncurry, Cheel 5.1925 (NSW 51998); Smith's Lake, Buladelah, Rupp 8.1923 (NSW 52001), 1.1924 (NSW 51999), 2.1924 (NSW 52000); North Head, Gribble 4.1961 (NSW 54086); Centennial Park, Forsyth 10.1896 (NSW 52002); Randwick, Hynes 8.1898 (SYD); near Long Bay Gaol, Evans 11.1960 (NSW 53069); near Little Bay Hospital, Evans 11.1931 (SYD); La Perouse, Briggs 7.1958 (SYD) chromosome count voucher, 2.1961 (NSW 53413); Cronulla, Cheel 10.1919 (NSW 52005); Drum and Drumsticks, near Point Perpendicular, Rodway 10.1932 (NSW 52006); 3 miles N of Point Perpendicular, Briggs 10.1959 (NSW 52009, SYD); Point Perpendicular, Johnson 4.1960 (NSW 52007); Point Perpendicular, Rodway 11.1916 (NSW 52008); Jervis Bay, Maiden 7.1899 (NSW 52010); Jervis Bay, Rodway 9.1930 (NSW 52015); Bowen Is., Jervis Bay, Rodway 11.1919 (NSW 52011), 12.1919 (NSW 52012), 4.1920 (NSW 52013), 12.1925 (NSW 52014); 9 miles W of Tomerong, Briggs 12.1957 (SYD), 6.1958 (NSW 52016); Pigeon House, Milton, Cambage 7.1915 (NSW 52017); Clyde, Bäuerlen 1888 (NSW 52018); New Holland, R. Brown 1802-5 (NSW 52019, 52020).

Cheel (l.c.) referred to *D. intermedia* A. Cunn. ex Schau., Myrt. Xeroc. II (1840) 190, pro synon. However neither Schauer nor Cheel cited under this name any collections from Cunningham's herbarium. In the absence of cited specimens there is no evidence that Cheel was correct in regarding this as a synonym of his var. *intermedia*. In addition, Cheel failed to distinguish between this variety and *D. diminuta*, including features of both in his descriptions. The name "*D. intermedia*" was also misapplied by Smith-White (1950, p. 108) to material of *D. diminuta* (see note under the latter species). In view of this confused usage it has been considered advisable to describe this taxon as a new species.

6. D. glaucophylla *B. Briggs*, sp. nov.

HOLOTYPE: Kariong, near Gosford, B. G. Briggs 5.1.1961 (NSW 53470).

Frutex, ramis primariis prostratis radicantibusque ad 2·5 m. longis, ramis lateralibus ascendentibus, 2-15 cm. altis. Folia decussata, glauca et saepe purpurascentia, triangularia in sectione transversa, 8-17 mm. longa, dimensione laterali 0·3-0·8 mm., dorsiventrali 1-2·2 mm. Flores in fasciculo (1-) 2-4, paribus dispositi, si flores 4 internodo 0·2-1 mm. longo paria separanti. Pedunculi 1-1·5 mm. longi. Bracteae 8-12 mm. longi, foliis similes. Bracteolae caducae, rubro-fuscae, oblongae, acutae vel apiculatae, 4-6 mm. longae. Tubus floralis 7-8 mm. longus, supra ovarium albus vel pallide viridis, versus apicem saepe rubescens; ovarium 0·6-1·2 mm. diametro, sine papillis, costis prominentibus longitudinaliter instructum. Lobi calycis deltoidei, integri vel dentati, 0·1-0·5 mm. longi. Petala late ovata, 1·5-2 mm. longa, incurva apicem floralem rotundatum formantia. Antherae rubro-fuscae. Stylus albus, interdum rubescens, 12-16 mm. longus, rectus, annulum capillorum ferens. Fructus 1-1·5 mm. diametro. Chromosomata gametica 6.

Shrub with the main stems prostrate and rooting, to 2·5 m. long, the lateral branches ascending, 2-15 cm. high. Leaves decussate, glaucous and often tinged with red-purple, triangular in transverse section, 8-17 mm. long, 0·3-0·8 mm. laterally, 1-2·2 mm. dorsiventrally. Flowers (1-) 2-4 in the clusters, arranged in pairs; when 4 flowers are present the pairs are separated by an internode 0·2-1 mm. long. Peduncles 1-1·5 mm. long. Bracts 8-12 mm. long, similar to the leaves. Bracteoles caducous, red-brown, oblong, acute or apiculate, 4-6 mm. long. Floral tube 7-8 mm. long, white or pale green above the ovary, often becoming red toward the apex; ovary 0·6-1·2 mm. diam., not papillate, with prominent longitudinal ridges. Calyx lobes deltoid, entire or dentate, 0·1-0·5 mm. long. Petals broad-ovate, 1·5-2 mm. long, incurved forming the rounded floral apex. Anthers dark red-brown. Style white, sometimes becoming red, straight, bearing a ring of hairs. Fruit 1-1·5 mm. diam. Chromosome number: n = 6. Fig. 5d.

DISTRIBUTION: Central Coast, Gosford district. In scrub and woodland on sandy soil, often rooted at edge of sandstone exposures and extending over the bare rock surfaces. Fig. 2b.

SPECIMENS EXAMINED: Gosford, Brough 10.1930 (SYD); Calga, Briggs 1.1961 (NSW 53471); Piles Creek, 1 mile W of Kariong, Briggs 1.1961 (NSW 53475); Head of salt water, Piles Creek, Blakely & Shiress 10.1926 (NSW 52048); between Kariong Trig. and Wiseman's Ferry Rd., Blakely & Shiress 8.1926 (NSW 52046); ¾ mile NE of Kariong Trig., NW of Wondabyne, Johnson 8.1950 (NSW 52045); Kariong Rifle Range, Briggs 9.1959 (SYD) chromosome count voucher, (NSW 52047).

Smith-White (1954, p. 22) referred to this species under the manuscript name "*D. mesembryanthemoides*".

7. D. biflora (*Cheel*) *B. Briggs*, stat. nov.

D. taxifolia A. Cunn. var. *biflora* Cheel in Proc. Linn. Soc. N.S.W. LVI (1922) 72, Basionym.

Lectotype: Cowan, R. H. Anderson & J. L. Boorman 8.1921 (NSW 51990). Several specimens were cited with the original description; the collection chosen is the only one marked by Cheel as " type ".

Cheel's brief varietal description is not diagnostic in specific rank. A new Latin description is therefore given.

Frutex erectus vel expansus, 20-80 cm. altus. Folia decussata, saepe ad ramos appressa, triangularia in sectione transversa, 6-10 mm. longa, dimensione laterali 0·3-0·8 mm., dorsiventrali 0·9-1·4 mm. Flores in fasciculo (1-) 2 (-4). Pedunculi 0·5-1 mm. longi. Bracteae 1-8 mm. longae, foliis similes vel caducae deltoideaeque scariosaeque. Bracteolae post anthesin deciduae, purpureo-rubrae, oblongae, apiculatae, 4-8 mm. longae. Tubus floralis viridis, 5-8 mm. longus, versus apicem constrictus, costis latis rotundatisque longitudinaliter instructus; ovarium 0·8-1·3 mm. diametro, sine papillis. Lobi calycis deltoidei, integri vel dentati, 0·2-0·4 mm. longi. Petala orbiculata, 1·2-1·8 mm. longa, incurva apicem floralem rotundatum formantia. Antherae fulvae. Stylus flavo-viridis, interdum rubescens, rectus vel leviter antrorse curvatus, 10-14 mm. longus, annulum capillorum ferens. Fructus 1·2-1·7 mm. diametro. Chromosomata gametica 6.

Erect or spreading shrub, 20-80 cm. high. Leaves decussate, often appressed to the branches, triangular in transverse section, 6-10 mm. long, 0·3-0·8 mm. laterally, 0·9-1·4 mm. dorsiventrally. Flowers (1-) 2 (-4) in the clusters. Peduncles 0·5-1 mm. long. Bracts 1-8 mm. long, similar to the leaves or caducous, deltoid and scarious. Bracteoles deciduous after anthesis, purple-red, oblong, apiculate, 4-8 mm. long. Floral tube green, 5-8 mm. long, constricted towards the apex, with broad rounded longitudinal ridges; ovary 0·8-1·3 mm. diam., not papillate. Calyx lobes deltoid, entire or dentate, 0·2-0·4 mm. long. Petals orbicular, 1·2-1·8 mm. long, incurved forming the rounded floral apex. Anthers yellow-brown. Style yellow-green, sometimes becoming red, straight or slightly curved antrorsely, 10-14 mm. long, bearing a ring of hairs. Fruit 1·2-1·7 mm. diam. Chromosome number: $n = 6$. Fig. 5c.

Distribution: Central Coast, from the Hawkesbury River to Port Jackson. Also single collections from the Blue Mountains and from Waterfall (ca. 25 miles SW of Sydney). In dry sclerophyll forest, usually on a shallow layer of shale or laterite overlying sandstone. Fig. 2a.

Specimens Examined: Peat's Rd., Deane 7.1884 (NSW 51988); Cowan, Hamilton 5.1915 (NSW 51989); Mt. Colah, Briggs 10.1958 (SYD) chromosome count voucher; Hornsby, Blakely 9.1917 (NSW 51992), 8.1926 (NSW 51993); Glenhaven, Hanton 8.1950 (NSW 51994); Gordon West, Tindale 8.1948 (NSW 7225); Beecroft, Jacobs 7.1917 (NSW 51995); Marsfield, Evans 8.1938 (SYD); Hunter's Hill, Andrew 8.1892 (TECH); Linden to Woodford, Hamilton 1.1914 (NSW 51996); near Waterfall, Rodway 7.1933 (NSW 51997).

Studies on this taxon by Smith-White (1950, 1954) were reported under the names " *D. taxifolia* var. *biflora* " and " *D. biflora* ", the latter being a *nomen nudum*.

8. D. peduncularis *B. Briggs*, sp. nov.

Holotype: Hornsby, near the Fish Ponds, B. G. Briggs 10.1958 (NSW 51985).

Frutex 60-150 cm. altus, divaricatim ramosus. Folia decussata, patentia vel leviter reflexa, triangularia in sectione transversa, 7-12 mm. longa, dimensione laterali 0·5-1 mm., dorsiventrali 1-2·2 mm. Flores in fasciculo (1-) 2 (-4). Pedunculi

4-7 mm. longi, saepe recurvi. Bracteae 1-10 mm. longae, foliis similes vel caducae deltoideaeque scariosaeque. Bracteolae caducae, purpureo-rubrae, oblongae, apiculatae, 4-8 mm. longae. Tubus floralis 9-12 mm. longus, supra ovarium albus vel aliquantulum flavescens, prope apicem interdum rubescens; ovarium leviter obconicum, apice 1·5-2 mm. diametro, sine papillis, costis latis rotundatisque longitudinaliter instructum. Lobi calycis deltoidei, integri vel dentati, 0·5-0·8 mm. longi. Petala late ovata, 1·2-1·8 mm. longa, haud incurva. Antherae fuscae. Stylus albus, antrorse arcte curvatus, 6-10 mm. longus, annulum capillorum ferens. Fructus 2-2·5 mm. diametro. Chromosomata gametica 6.

Shrub 60-150 cm. high, divaricately branched. Leaves decussate, spreading or slightly reflexed, triangular in transverse section, 7-12 mm. long, 0·5-1 mm. laterally, 1-2·2 mm. dorsiventrally. Flowers (1-) 2 (-4) in the clusters. Peduncles 4-7 mm. long, often recurved. Bracts 1-10 mm. long, similar to the leaves or deltoid and scarious. Bracteoles caducous, oblong, apiculate, purplish red, 4-8 mm. long. Floral tube 9-12 mm. long, white or cream above the ovary, sometimes becoming red near the apex; ovary slightly obconical, 1·5-2 mm. diam. at the summit, not papillate, with broad rounded longitudinal ridges. Calyx lobes deltoid, entire or dentate, 0·5-0·8 mm. long. Petals broad-oblong or reniform, 1·2-1·8 mm. long, not incurved. Anthers yellow-brown. Style white, strongly curved antrorsely, 6-10 mm. long, bearing a ring of hairs. Fruit 2-2·5 mm. diam. Chromosome number: n = 6. Fig. 5b.

DISTRIBUTION: Central Coast, from the Hawkesbury River to Hornsby. In sclerophyll forest, on shallow soil over sandstone. Fig. 2a.

SPECIMENS EXAMINED: E of Parsley Bay, Brooklyn, Hawkesbury R., Johnson 10.1953 (NSW 51981); Parsley Bay, Briggs 7.1958 (NSW 51982, SYD); Berowra, near Gundar Trig., Briggs 8.1959 (NSW 51983, SYD); Hornsby, Ford 10.1946 (NSW 51984); Hornsby, Fraser 10.1946 (SYD); Hornsby, Drover 10.1946 (SYD); Fish Ponds, Hornsby, King 12.1951 (NSW 51986); Fish Ponds Creek, Hornsby, Johnson 10.1946 (NSW 51987). The chromosome count voucher is an isotype (SYD).

9. D. procera *B. Briggs*, sp. nov.

HOLOTYPE: Piles Creek near Kariong, B. G. Briggs 14.5.1961 (NSW 54087).

Frutex erectus 0·8-3 m. altus. Folia decussata, triangularia in sectione transversa, facie superiore plerumque concava, 10-25 mm. longa, dimensione laterali 0·5-1 mm., dorsiventrali 1·4-2·5 mm. Flores in fasciculo (2-) 4 (-8), in paribus dispositi. Pedunculi 1-2 mm. longi. Bracteae 4-13 mm. longae, versus basin rubro-fuscae dilatataeque membranaceaeque versus apicem plerumque virides triquetraeque. Bracteolae post anthesin deciduae, rubro-fuscae vel purpureo-rubrae, oblongae, apiculatae, 8-11 mm. longae. Tubus floralis 5-8 mm. longus, costis latis rotundatisque longitudinaliter instructus, supra ovarium albus, prope apicem interdum rubescens; ovarium 1·5-2 mm. diametro, sine papillis. Lobi calycis deltoidei, integri vel dentati, 0·4-0·8 mm. longi. Petala orbiculata vel reniformia, 1·5-1·7 mm. longa, incurva apicem floralem conicum formantia. Antherae rubro-fuscae. Stylus albus, interdum rubescens, rectus vel leviter antrorse curvatus, 14-20 mm. longus, annulum capillorum ferens. Fructus 2-2·5 mm. diametro. Chromosomata gametica 6.

Erect shrub 0·8-3 m. high (reported to 5 m.). Leaves decussate, triangular in transverse section, the upper face usually concave, 10-25 mm. long, 0·5-1 mm. laterally, 1·4-2·5 mm. dorsiventrally. Flowers (2-) 4 (-8) in the cluster, arranged in pairs. Peduncles 1-2 mm. long. Bracts 4-13 mm. long, the expanded base

membranous and red brown, the upper ⅓ usually green and triquetrous. Bracteoles deciduous after anthesis, red-brown or red-purple, oblong, apiculate, 8-11 mm. long. Floral tube 5-8 mm. long, with broad, rounded, longitudinal ridges, more prominent above; white above the ovary, the apex often becoming red; ovary 1·5-2 mm. diam., not papillate. Calyx lobes deltoid, entire or rarely dentate, 0·4-0·8 mm. long. Petals orbicular or reniform, 1·5-1·7 mm. long, incurved forming the conical apex of the flower. Anthers red-brown. Style white, sometimes becoming red, straight or slightly curved antrorsely, 14-20 mm. long, bearing a ring of hairs. Fruit 2-2·5 mm. diam. Chromosome number: n = 6. Fig. 5f.

Distribution: Central Coast, from Gosford to Manly. In sclerophyll forest on sheltered sandstone slopes. Fig. 2a.

Specimens Examined: Piles Creek near Kariong, Briggs 2.1958 (SYD) chromosome count voucher; Piles Creek, Blakely & Shiress 8.1926 (NSW 51968); Hawkesbury R., Cheel 7.1912 (NSW 51969); Hawkesbury R., Cheel & Cleland 7.1912 (NSW 51970); Cowan Ck., Blakely & Shiress 11.1918 (NSW 51971); Cowan, Hamilton 5.1915 (NSW 51972); Cowan, Briggs 7.1957 (SYD); between Berowra and Cowan, Blakely & Shiress 9.1928 (NSW 51973); Berowra, Hamilton 1.1899 (NSW 51974); Berowra, Blakely 10.1935 (NSW 51975); Berowra, Evans 8.1923 (SYD), 10.1923 (SYD), 10.1925 (SYD), 11.1937 (SYD); Berowra, Burges 8.1931 (SYD); Berowra, Carne 8.1914 (NSW 51976); Berowra, Blakely & Shiress 8.1919 (NSW 51977); Berowra, Mills 8.1940 (NSW 51978); Berowra, Salasoo No. 694, 6.1951 (NSW 51979); Berowra Creek, Baker 9.1897 (TECH); Narrabeen, Penfold 8.1922 (NSW 51980); Middle Harbour Ck., Evans & Blaxell 8.1960 (NSW 52061); French's Forest to Brookvale, Johnson 8.1947 (NSW 3966).

Material of this species was referred to *D. taxifolia* var. *grandiflora* Benth. by Baker and Smith in Journ. Roy. Soc. N.S.W. 33 (1899) 164. The misapplication was continued when these authors raised this variety to specific rank as *D. grandiflora* (see typification of that species). Subsequently Cheel (1922) and Smith-White (1950, 1954) also applied the name *D. grandiflora* to material of *D. procera*.

10. D. fascicularis *Rudge* in Trans. Linn. Soc. XI (1815) 299, t. 22; Schauer, Myrt. Xeroc. I (1840) 188, t. 2D; Benth. in Journ. Linn. Soc. (Bot.) IX (1865) 176; Benth., Fl. Austral. III (1867) 13; Moore & Betche, Handb. Fl. N.S.W. (1893) 189; Baker & Smith in Journ. Roy. Soc. N.S.W. XXXIII (1899) 163; Britten in Banks & Solander, Ill. Bot. Cook's Voyage II (1901) 35, pl. 101; Maiden & Betche, Census N.S.W. Plants (1916) 157; Cheel in Journ. Roy. Soc. N.S.W. LVI (1922) 69; Smith-White in Proc. Linn. Soc. N.S.W. LXXVI (1950) 111.

Cryptostemon ericaeus F. Muell. in Miquel, Nederl. Kruidk. Arch. IV (1856) 115. No type material has been located; the description agrees fully with *D. fascicularis*.

Holotype: New Holland (Botany Bay), Banks & Solander 1770 (BM), not examined. Isotype (NSW 51946).

Erect or decumbent shrub 15-300 cm. high. Leaves crowded at ends of branches, opposite or whorled, 3- to 8-seriate, acicular, circular or ovate in transverse section when fresh but sometimes concave above when dry, the dorsal surface rounded, 8-16 mm. long, 0·5-1 mm. laterally, 0·5-1·2 mm. dorsiventrally. Flowers (2-) 4-20 in the clusters, arranged in pairs or crowded and apparently irregularly arranged. Peduncles 0·6-1 mm. long. Bracts 2-14 mm. long, similar to leaves or caducous, deltoid and scarious. Bracteoles caducous, deltoid or oblong, acute, 3-5 mm. long. Floral tube 5-7 mm. long, white above the ovary, becoming red toward the apex in old flowers; ovary 0·8-1·2 mm. diam., the longitudinal ridges broad and rounded when fresh but more prominent when dry. Calyx lobes deltoid, dentate or rarely entire, 0·3-0·5 mm. long. Petals orbicular or reniform, 0·8-1·4 mm. long, incurved forming the truncate floral apex. Anthers dark red-brown. Styles red or white, 12-18 mm. long, straight or slightly curved antrorsely, bearing a ring of hairs. Fruit 1-1·5 mm. diam. Chromosome number: n = 6 (both subspecies).

Bentham, Fl. Aust. III (1867) 13 pointed out that *Francisia* Endl., Gen. Pl. (1840) 1226 was based on a drawing by F. Bauer of *D. fascicularis.* No specific name was given with the description of the genus.

A report of the occurrence of this species in "southern localities" in Queensland by F. M. Bailey, Queensl. Fl. II (1900) 575, is not confirmed by specimens in BRI or NSW.

The species comprises two geographic races which are here placed in subspecific rank.

1. Flowers usually more than 4 in the clusters, crowded and apparently irregularly arranged. Erect or rarely decumbent shrubs. Branches lacking adventitious roots .... ssp. *fascicularis.*

1.* Flowers (2-) 4 (-6) in the clusters, regularly arranged in pairs. Decumbent shrubs, the major branches often producing adventitious roots .... ssp. *oligantha.*

a. **ssp. fascicularis.**

Erect, spreading or rarely decumbent shrub, 30-300 cm. high, branches not producing adventitious roots. Flowers 4-20 in the clusters, crowded and apparently irregularly arranged. Fig. 5g.

DISTRIBUTION: Central Coast, from Gosford to Bulli, within 20 miles of the coastline, On shallow soil at edges of flat exposures of sandstone, usually in dry sclerophyll scrub or heath, below 1,500 ft. altitude. Fig. 3.

SPECIMENS EXAMINED: Gosford, Harris & Butler 10.1923 (NSW 51911); Piles Ck. near Kariong, Briggs 2.1958 (SYD) chromosome count voucher; Warrah, Oxenford 4.1949 (NSW 51912); 3 miles S of Commodore Heights, Johnson 4.1951 (NSW 51913); Tumbledown Dick, Terrey Hills, Blakely & Shiress 6.1918 (NSW 51914); Elanora Heights, Rodway 10.1934 (NSW 51915); Narrabeen, Mills 7.1940 (NSW 51916); Narrabeen, Fletcher 10.1889 (NSW 51945); Middle Harbour Ck., Evans 8.1960 (NSW 52060); Dee Why, Rodway 10.1934 (NSW 51917); French's Forest, Cross 9.1945 (NSW 2205); Pennant Hills, Fraser 3.1928 (NSW 51918); Manly, Deane 9.1888 (NSW 51919); Manly, Camfield 9.1893 (NSW 51920); Mosman, Dixon 10.1904 (NSW 51921); Port Jackson district, Harvey ca. 1850 (NSW 51922); Port Jackson, Weber 1880 (NSW 51923); Port Jackson district, Helms 9.1902 (NSW 51924); Rose Bay, Fletcher 7.1889 (NSW 51925); Rose Bay, Helms 4.1900 (NSW 51926); Randwick, Deane (NSW 51928); La Perouse, Rupp 10.1915 (NSW 51929); La Perouse, Briggs 2.1961 (NSW 53413); Kurnell, Boorman 5.1906 (NSW 51931), 7.1921 (NSW 51930); Cape Solander, Johnson 10.1945 (NSW 51932); Cronulla, Cheel 1.1918 (NSW 51933); Cronulla, Hamilton 12.1916 (NSW 51934); near Sutherland, St. John No. 24563, 12.1950 (NSW 51935); Loftus, Camfield 10.1898 (NSW 51936); National Park, Ford 7.1946 (NSW 51937); Warumbul Rd., National Park, Ford 8.1952 (NSW 51938); near Waterfall, Deane 8.1888 (NSW 51939); George's R., 3 miles E of Leumeah, Johnson 11.1948 (NSW 51940); Woronora R., Cheel 9.1923 (NSW 51941); Prince's Highway W of Coalcliff, Johnson 1.1952 (NSW 51942); Junction of Darke's Forest Rd. and Prince's Highway, Briggs 12.1957 (SYD) chromosome count voucher.

In most populations of this subspecies the styles are white when the flowers open, becoming red several days after style elongation, but in many sites between the Hawkesbury River and Port Jackson the styles of all plants become red before emergence.

Variation in the number of flowers per cluster is also apparent, and statistically significant differences were shown by sampling of the regions of the distribution area separated by the Hawkesbury River and the Port Jackson basin (Figs. 3, 6). This feature shows a cline with a distinct step where the Hawkesbury River valley forms a discontinuity in the distribution.

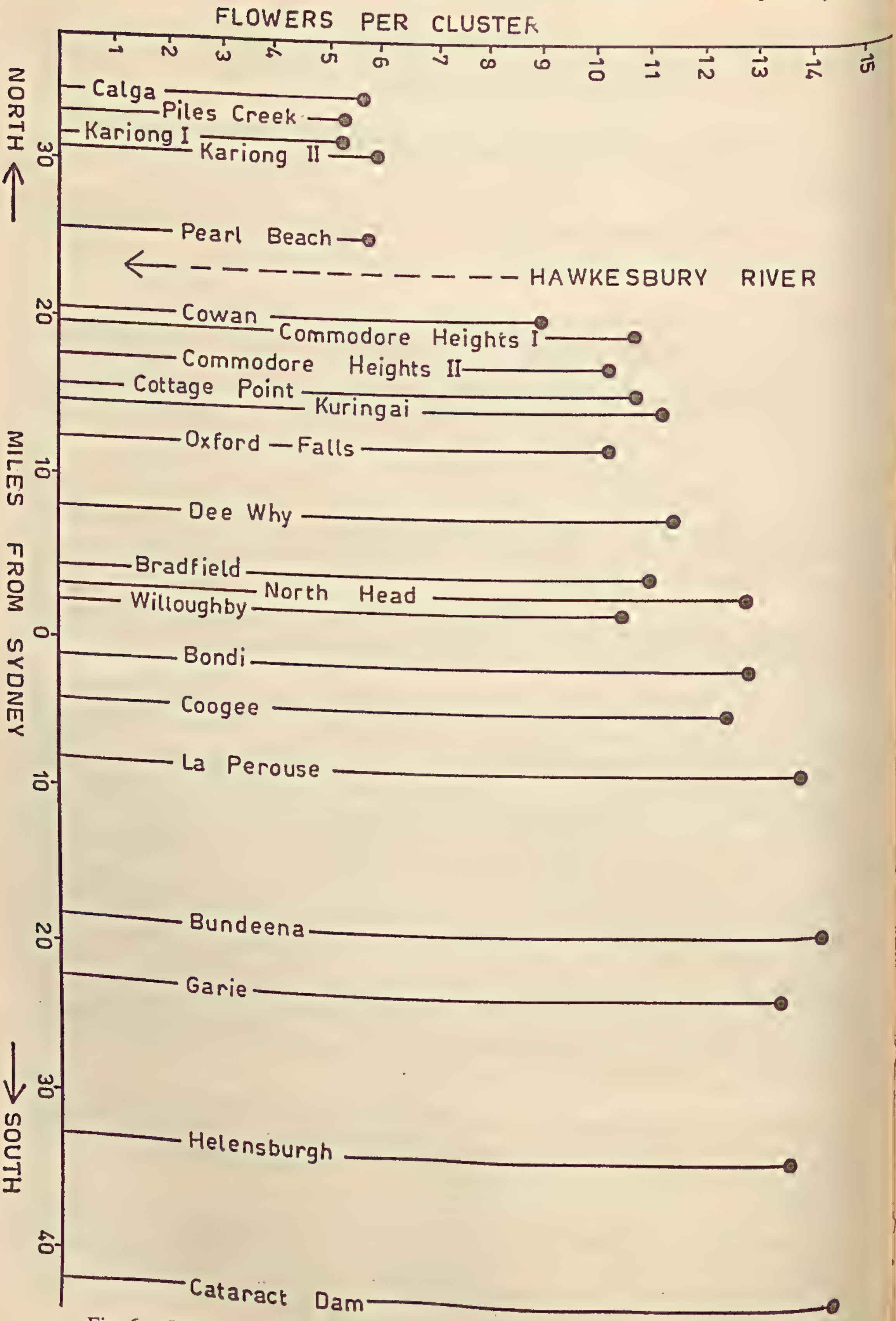


Fig. 6. *D. fascicularis* ssp. *fascicularis*, number of flowers per cluster in local population samples. Mean values from samples of 10 clusters from each of 20 plants, projected on to a north-south line through Sydney.

No appreciable change in this character was shown throughout the extended flowering season of the species, and transplants grown under similar conditions maintained their original differences in cluster size. Plants with small flower clusters produce them in greater numbers so the reproductive potential does not appear to be reduced. No other character showed variation correlated with the trend in flower number, therefore the variation in the latter is probably not due to introgression with any other taxon.

Hybridization in the group will be discussed in detail elsewhere. The presence of morphological intermediates in natural populations indicates that *D. fascicularis* hybridizes with certain other species; such probable hybrids are represented by the following collections.

D. fascicularis ssp. *fascicularis* × *D. grandiflora:* 5 miles SSW of Helensburgh, Briggs 10.1958 (NSW 52052, SYD); Plateau W of Coalcliff, Johnson 5.1951 (NSW 52054), 1.1952 (NSW 52053).

D. diminuta × *D. fascicularis* ssp. *fascicularis:* 5 miles SSW of Helensburgh, Briggs 2.1961 (NSW 53476).

D. fascicularis ssp. *fascicularis* × *D. glaucophylla:* Mangrove Mountain, Blakely 1.1936 (NSW 52050); Piles Creek, Gosford district, Blakely & Shiress 10.1926 (NSW 52051); ¾ mile NE of Kariong Trig., Johnson 8.1950 (NSW 52049); Kariong Rifle Range, Briggs 9.1959 (SYD).

D. fascicularis ssp. *fascicularis* × *D. procera:* Piles Creek, near Kariong, Briggs 2.1958 (NSW 52055, SYD); Middle Harbour Creek, Briggs 8.1960 (NSW 52171).

b. ssp. oligantha *B. Briggs*, ssp. nov.

HOLOTYPE: 1 mile NE of Mt. Banks, B. G. Briggs 25.3.1961 (NSW 53741).

A subspecie typica habitu decumbenti, 15-30 (-60) cm. alto, ramis primariis saepe prostratis radicantibusque, floribus in fasciculis (2-) 4 (-6) in paribus dispositis, differt.

Differs from subspecies *taxifolia* in the following features: habit decumbent, 15-30 (-60) cm. high, with branches often prostrate and rooting, flowers (2-) 4 (-6) in the clusters, arranged in pairs. (Not figured, similar to Fig. 5g in the features shown).

DISTRIBUTION: Central Tablelands, Blue Mountains from Mt. Banks to Wentworth Falls. On shallow soil at edges of sandstone exposures, above 2,000 ft. altitude. Fig. 3.

SPECIMENS EXAMINED: Mt. King George (now Mt. Banks), Fletcher 1.1894 (NSW 51947); Mt. Banks by Caley's Point, Wilson 3.1957 (NSW 51948); Mt. Banks, Briggs 8.1958 (SYD); Wentworth Falls, Maiden 10.1898 (NSW 51949); Wentworth Falls, Penfold 4.1922 (NSW 51950); Wentworth Falls, Johnson 11.1954 (NSW 51951); Wentworth Falls to King's Tableland, Whaite No. 1210, 5.1952 (NSW 51952); King's Tableland, Wentworth Falls, Briggs 7.1958 (SYD) chromosome count voucher; King's Tableland, Blakely & Shiress 5.1921 (NSW 51953); Woodford, Cheel 6.1913 (NSW 51954); Woodford, Hamilton 1.1915 (NSW 51955); Woodford, Briggs 7.1958 (SYD).

Studies on this subspecies were reported under the name "*D. taxifolia* A. Cunn. f. *tetraflora*" by Smith-White (1950, p. 111) but this is a *nomen nudum* as only an English description was given.

SPECIES EXCLUDENDA

Darwinia virgata (A. Cunn.) F. Muell., Fragm. Phytogr. 9 (1875) 176 = *Homoranthus virgatus* A. Cunn.

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SUMMARY

The ten species of *Darwinia* occurring in New South Wales form a natural group which is limited to that State with the exception of *D. camptostylis* which extends into eastern Victoria. *D. biflora* and *D. leptantha* are placed in specific rank (formerly *D. taxifolia* var. *biflora* and var. *intermedia*) and the following new taxa are described: *D. camptostylis*, *D. diminuta*, *D. glaucophylla*, *D. peduncularis*, *D. procera*, *D. fascicularis* ssp. *oligantha* and *D. taxifolia* ssp. *macrolaena*. The name *D. grandiflora* is shown to have been misapplied by recent authors. The chromosome number $n = 6$ has been found to be constant throughout the group. Interspecific hybridization and breeding systems are briefly considered. Distribution maps and a key are provided.

LITERATURE CITED

Bentham, G., 1867.—Flora Australiensis, III. London.

Brewster, A. A., 1915.—Observations on the pollination of *Darwinia fascicularis* Rudge (N. O. Myrtaceae). Proc. Linn. Soc. N.S.W. XL: 753-758.

Cheel, E., 1922.—Notes on the genera *Darwinia*, *Homoranthus* and *Rylstonea* in New South Wales, Queensland, and South Australia. J. and Proc. Roy. Soc. N.S.W. LXVI: 62-77.

Lanjouw, J. and Stafleu, F. A., 1959.—Index Herbariorum, pt. I, ed. 4.

Smith-White, S., 1950.—Cytological studies in the Myrtaceae. III. Cytology and phylogeny in the Chamaelaucoideae. Proc. Linn. Soc. N.S.W. LXXV: 99-121.

Smith-White, S., 1954.—Cytological studies in the Myrtaceae. IV. The sub-tribe Euchamaelaucineae. Proc. Linn. Soc. N.S.W. LXXIX: 21-28.

Notes on *Lomandra* in New South Wales

ALMA T. LEE

These notes are published to validate nomenclature and to clarify typification in several species, as a preliminary to treatment of the genus in the Flora of New South Wales now being prepared. New taxa, new combinations, and Lectotypes are published.

Where specimens, Type or other, are cited, these have been examined unless otherwise stated.

Distribution of new taxa is given in general terms for New South Wales, since detailed citation of specimens from this State will appear in the Flora; conversely distribution in other States is given in terms of cited specimens since these will not be included in the Flora.

THE LOMANDRA FILIFORMIS COMPLEX (NOS. 1-5).

The circumscription of *Lomandra filiformis* (Thunb.) J. Britt., adopted by Bentham as *Xerotes filiformis* R.Br. in Fl. Aust. VII (1878) 103 and followed in later botanical works, is a very broad one. Some elements within it are so nearly discontinuous that their recognition as species is clearly desirable. Thus *L. gracilis*, *L. laxa*, *L. cylindrica* and *L. brevis* are here given specific rank, the first three having been recognised as species in *Xerotes* by Brown in 1810 but rarely distinguished since.

Even after the removal of these elements, there remains quite a complex of phenotypes which fall into poorly defined groups lacking a high degree of discontinuity but demanding some recognition of their morphological differences; these differences, being loosely correlated with geographical distribution, are recognised here as subspecific. Only those variants which occur in New South Wales have been considered, though these may extend also into other States.

1. Lomandra filiformis (*Thunb.*) *J. Britt.* in Banks & Solander, Bot. Cook's Voy. III (1905) 95 as to basionym; Williamson in Vic. Nat. XLV (1928) 37 and Fig. 9, in part; Ewart, Fl. Vic. (1930) 276, in part.

Dracaena filiformis Thunb., Diss. bot. de *Dracaena* (1808) 4, BASIONYM.

Xerotes filiformis (Thunb.) R.Br., Prodr. (1810) 261 as to Basionym excl. descr. et spec. This name is nomenclaturally based on *D. filiformis* Thunb. but the cited specimens are *L. cylindrica* Lee (see below). Since Brown's name and Bentham's broad circumscription for the species have been widely adopted, the following references under *X. filiformis* R.Br. apply wholly or in part to *L. filiformis:* Benth., Fl. Aust. VII (1878) 103; F. M. Bail., Qld. Fl. V (1902) 1662; Domin in Bibl. Bot. XX Heft 85[1] (1915) 526; Maid. & Betche, Census (1916) 42.

Xerotes tenuifolia R.Br., Prodr. (1810) 261. HOLOTYPE: Port Jackson, R. Brown, Iter Australiense No. 5756 (BM; photograph only seen; compared with specimens sent, and reported on by Kew officer in 1955).

Xerotes denticulata R.Br., l.c. HOLOTYPE: Port Jackson, R. Brown, Iter Australiense No. 5758 (BM; photograph only seen; compared with specimens sent, and reported on by Kew officer in 1955).

Xerotes thunbergii F. Muell., Fragm. VIII (1874) 208 as to its basionym *X. filiformis* R.Br.; excl. at least the sessile-flowered plants; Moore & Betche, Handb. Fl. N.S.W. (1893) 425, in part.

HOLOTYPE: "E nova Hollandia per Smith" in Herb. Thunberg (UPS; photograph and leaf fragment only seen, with report from C. G. Alm, 1955).

DISTRIBUTION: Eastern States of Australia, chiefly in Coast and Tablelands divisions.

In New South Wales there is a loose differentiation into southern (ssp. *coriacea*) and northern (ssp. *filiformis*) populations, while a third (ssp. *flavior*) has a limited range in the Central Tablelands and Central Western Slopes of New South Wales, but there is by no means a simple clinal variation. In Victoria ssp. *coriacea* seems to be dominant but ssp. *filiformis* is also present; in Queensland the latter only is represented, though I have seen only rather small collections from these States. A few specimens are difficult to distinguish from the closely related *L. gracilis* and *L. brevis* (in central and southern divisions) or from *L. laxa* (in northern divisions of New South Wales).

a. **Lomandra filiformis** (*Thunb.*) *J. Britt.* ssp. **flavior ssp. nov.**

HOLOTYPE: Orange district, Madsen 11.1948 (NSW 51673).

A typo in conspectu flaviore sicco, in foliis lentis rigidis, in paniculis masculis densis quam folia multo brevioribus rachidibus omnino levibus gracilibusque, florum masculorum pedicellis quam bracteas manifeste brevioribus, in paniculis femineis brevissimis multiramosis, differt. Folia levia, involuta, 30-40 cm. longa, 2-4 mm. lata 11-12 venulis, apice dentata, marginibus levibus, base lacerata pallida; paniculae masculae ad 7 cm. longae in pedunculum ca. 2 cm. longum, femineae 2-4 cm. inter folia obscurae; bracteae inferiores ad 15 mm., superiores ca. 2 mm. longae.

Differs from the Type in its yellowish aspect at least in dried specimens, its tougher leaf texture and its very condensed panicles. Leaves tough and rather rigid, smooth, inrolled, 30-40 cm. long, 2-4 mm. broad with 11-15 veins, the apex irregularly toothed, the base-margins pale and finely lacerate into fibres. Male panicle up to 7 cm. long on a short obscure peduncle of about 2 cm., the rachides smooth, slender, straw-coloured, the bracts pale or white, broad-based, the lower up to 15 mm. long, the upper short but still exceeding the pedicels; female panicle shorter with fewer flowers and branches, 2-4 cm. long but many- and smooth-branched.

DISTRIBUTION: Central Tablelands and Western Slopes of New South Wales.

b. **Lomandra filiformis** (*Thunb.*) *J. Britt.* ssp. **coriacea ssp. nov.**

HOLOTYPE: Colo Vale (road to Mt. Flora), Lee 11.1955 (NSW 51852, male, and ALLOTYPE female).

A Typo in habitu crassiore, in foliis subplanis saepe scabris infra et marginibus, 2·5-4 mm. latis 12-20 venulis, apice obtusis sine dentibus praeter juvenilibus, differt. Paniculae masculae latiores, ramulis inferioribus interdum verticillatis, quam pedunculos longiores rachidibus saepe perscabridis.

Differs from the Type in its tougher, thicker, almost flat leaves, often scabrid but sometimes quite smooth, with very small apical teeth eroded early and seen only in the youngest leaves, and in its shortly pedunculate, usually broader male panicle with sometimes verticillate lower branches, the rachides scabrid, often strongly, at least distally.

DISTRIBUTION: Central to Southern New South Wales, chiefly in Coast and Tablelands districts, and in Victoria. VICTORIA: Grampians Mts., Dunkeld Road., 13 km. S of Hall's Gap, Muir No. 865, 9.1959 (MEL; NSW 51075); Upper Yarra, Walter 10.1893 (NSW 53752); Dividing Range, Walter 10.1898 (NSW 51872); Toorak, Staer 4.1911 (NSW 51867; 51868); Port Phillip, Tovey 1891 (AD 95940115; prob. dup. NSW 51869); Narre Warren, Staer 4.1911 (NSW 51871); Hawkesdale, Williamson 11.1899 (NSW 51870); 4½ miles N of Anglesea along the Gum Flat road, Aston No. 377, 10.1959 (MEL).

The Victorian specimens tend to be slighter in stature and the inflorescence less broad and dense, so that in these features they approach some forms of ssp. *filiformis;* the scabridities on rachis and leaf are retained, however, and the leaves are usually thick and tough as in the New South Wales plants.

2. Lomandra gracilis (*R.Br.*), comb. nov.

Xerotes gracilis R.Br., Prodr. (1810) 261, BASIONYM.

HOLOTYPE: Port Jackson, R. Brown, Iter Australiense No. 5757 (BM; not seen; reported on and matched with specimen sent, by Kew officer, 1955).

This species has generally been included, unrecognised, in *Lomandra* (or *Xerotes*) *filiformis.*

3. Lomandra laxa (*R.Br.*), comb. nov.

Xerotes laxa R.Br., Prodr. (1810) 261, BASIONYM.

HOLOTYPE: R. Brown, Iter Australiense No. 5759 (BM; photograph only seen; Type reported on by Kew officer, 1955).

This species is not common in New South Wales; in Queensland, where it has been more often collected, it has usually been included in *Lomandra* (or *Xerotes*) *filiformis.*

4. Lomandra cylindrica, sp. nov.

HOLOTYPE: Palm Beach (Pacific Rd.), Lee 22.10.1953 (NSW 49118; male, with ALLOTYPE female).

MISAPPLIED NAME: This species was originally recognised as *Xerotes filiformis* R.Br. (Prodr. (1810) 261). Brown, however, based his species nomenclaturally on *Dracaena filiformis* Thunb., a different species. The cited specimens are at BM (R. Brown, Port Jackson (bis), and between Parramatta and Sydney, Iter Australiense No. 5755; not seen; reported on and matched with specimens sent, by Kew officer, 1955).

Species acaulis, floribus non glomeratis, masculis campanulatis 1·25-2 mm. longis, flavis, in pedicellis recurvis 2-3 mm. longis, femineis 2-3 mm. longis in pedicellis erectioribus brevioribusque 0·5-1 mm.; saepe floribus hermaphroditis vel enormibus; panicula mascula pauciramosa, plerumque infra foliorum medium, saepe 8-15 cm. longa rachidibus levibus; feminea similis minorve, pauciflora, rachidibus aliquando scaberulis; surculis 2-3- vel paucifoliatis; foliis teretibus vel semiteretibus, saepe contortis, rigidis plerumque ca. 30 cm. longis, 1-2 mm. diam., levibus vel scaberulis, apice acuminatis parce complanatis, base rubidis vel purpurei-fuscis, marginibus parce laceratis.

Sparsely-leaved tufted plants, the shoots bearing only a few, often 1-3, vegetative leaves above a series of straw-coloured, polished, scale leaves. Leaves wiry, terete or semiterete, or rarely concavo-convex and very thick usually at least the distal part terete, often twisted in growth, 1-2 mm. in diameter, 15-70, usually about 30, cm. long, smooth or somewhat scabrous, the bases reddish or purplish brown with very little laceration of the margins, the apex entire, acuminate, rarely flattened (in a semiterete leaf); scale leaves at the base more numerous and conspicuous than in most species. Male inflorescence a narrow panicle with few, short branches, usually below the middle of the leaves or rarely as high, often 4-9 cm. long, with smooth rachides, on a peduncle of nearly equal length; female inflorescence similar or more often a few-flowered raceme with only about 8-16 flowers, the rachides sometimes scaberulous. Flowers campanulate, subtended by a small bract of 0·5-1 mm. with an almost microscopic bracteole lateral to it, the males 1·25-2 mm. long on a slender recurved pedicel of 2-3 mm., the females 2-3 mm. long on a shorter pedicel of 0·5-1 mm., but the flowers often showing irregularity of sex with males, females and hermaphrodites occurring on the one plant with corresponding characters, the hermaphrodites more or less intermediate; perianth segments joined only at the base, the outer shorter and thinner than the fleshy inner ones in the male flowers; outer segments in the females soon becoming firm. Capsule rounded-tetrahedral, wrinkled, 3-4 mm. long. Flowering in Spring to early Summer.

Distribution: Central Coast and Tablelands, and South Coast of New South Wales, in sclerophyll forest.

L. cylindrica approaches most closely to *L. gracilis*, differing in its leaf-form, few-leaved shoots and smaller inflorescences; a few specimens suggest that discontinuity here is not absolutely complete. It has usually been included in *Lomanda* (or *Xerotes*) *filiformis* in this State.

5. Lomandra brevis, sp. nov.

Holotype: Hornsby, track to Waterfall Ck., Blakely 1.1.1915 (NSW 49356).

Species subacaulis, floribus masculis non glomeratis, siccis subnigris, late campanulatis, 2-4 mm. longis, in pedicellis patentibus ad recurvis 2-4 mm. longis, perianthii foliolis base conniventibus, femineis ignotis; paniculis angustis saepe 8-10 cm. longis, ramis paucis brevibusque, rachidibus levibus; foliis angusti-linearibus, 5-23, plerumque ca. 15, cm. longis, 0·5-1 mm. latis, venulis 3-7, paulo convolutis, margine levibus vel sublevibus, apice acutis sine dentibus, base supra vaginam purpureis, infra pallidis, marginibus in fibras laceratis.

A tufted species with condensed stems forming compact cushions of shoots from ascending rhizomes. Flowers (only the males known) singly in the inflorescence, characteristically blackish in dried specimens, broad-campanulate as in *L. laxa* but the perianth segments thicker in texture, joined only near the base, 2-4 mm. long on spreading or recurved pedicels 2-4 mm. long. Male inflorescence a narrow panicle with few, usually short, smooth branches. Leaves 5-23, usually about 15, cm. long, 0·5-1 mm. broad with 3-7 veins, slightly inrolled, smooth or nearly so on the margins, the base purplish above the sheath, paler below, with margins lacerate into pale fibres.

Distribution: Coastal highlands of New South Wales around Port Jackson.

This species has been included in the broad concept of *L. filiformis*. It seems to be most closely related to *L. gracilis*.

THE LOMANDRA LONGIFOLIA COMPLEX (NOS. 6-10).

As in *L. filiformis*, the history of this group of species has been one of division by Brown, and combining by Bentham who has been more or less followed in later works. Brown, in his Prodromus (1810) 262, described *Xerotes arenaria*, *X. montana*, *X. hystrix* and *X. fluviatilis*, in addition to Labillardière's *L. longifolia*, and Bentham included them all in his concept of *X. longifolia*. This investigation has shown that of these names *L. longifolia*, *X. montana* and *X. fluviatilis* can be maintained as species, while *X. hystrix* can be accorded subspecific rank. Also belonging to the group are the subsequently described *L. confertifolia* and *L. spicata*.

6. Lomandra longifolia *Labill.*, Pl. Nov. Holl. I (1804) 92, t. 119; J. Britten in Banks & Solander, Bot. Cook's Voy. III (1905) 95, t. 312, in part; Williamson in Vic. Nat. XLV (1928) 35, Fig. 4, 4a, in part; Ewart, Fl. Vic. (1930) 277, in part; Black, Fl. S.A. ed. 2 (1943) 187 in part.

Xerotes longifolia R.Br., Prodr. (1810) 262. Although based nomenclaturally on *L. longifolia* Labill., Brown's circumscription of the species was a narrow one, while subsequent botanists have used his name in a broader sense, so that the following references under *X. longifolia* R.Br. apply wholly or in part to *L. longifolia*: Schnitzlein, Icon. I (1845) t. 516 (8); Sonder in Linnaea XXVIII (1856) 220; Moore & Betche, Handb. Fl. N.S.W. (1893) 424; F. Muell., Fragm. VIII (1874) 210; Benth., Fl. Aust. VII (1878) 97; F. M. Bail., Qld. Flora V (1902) 1660; Maiden & Betche, Census (1916) 42.

HOLOTYPE: Not seen; Labillardière's description is accompanied by an illustration which is considered to identify the plant satisfactorily. It is noteworthy, however, that Labillardière clearly describes and illustrates a mature hermaphrodite flower, a rare occurrence in *Lomandra*, though very young flowers have been found with both androecium and gynoecium in many cases.

DISTRIBUTION: *L. longifolia* is a very widespread species, occurring in all the eastern States and in South Australia and Tasmania, and showing considerable variation.

In Queensland there is a suggestion of confluence with *L. confertifolia* ssp. *pallida* through the smaller form of *L. longifolia* described by Brown as *Xerotes arenaria*. In New South Wales, not only are the subspecies of *L. longifolia* sufficiently distinct, but there is little difficulty in distinguishing the species from *L. confertifolia*, represented here by four subspecies, ssp. *pallida*, ssp. *rubiginosa*, ssp. *similis* and ssp. *leptostachya*. In Victoria, the large broad-leaved *L. longifolia* ssp. *longifolia* is present, but shows more intergradation with reduced forms seen only at higher altitudes in New South Wales (*L. longifolia* ssp. *exilis*); there is also an unnamed phenotype long ago noted by Mueller from the Gellibrand R. Only the ssp. *leptostachya* of *L. confertifolia* occurs in Victoria and there is no sign of confluence with *L. longifolia*. I have seen only *L. longifolia* ssp. *longifolia* from South Australia and Tasmania.

a. **Lomandra longifolia** *Labill.* ssp. **hystrix** (*R.Br.*), **comb. nov.**

Xerotes hystrix R.Br., Prodr. (1810) 262, BASIONYM.

Xerotes longifolia R.Br. var. *hystrix* (R.Br.) Domin in Bibl. Bot. XX Heft 85^1 (1915) 526.

Lomandra hystrix (R.Br.) Fraser & Vickery in Proc. Linn. Soc. N.S.W. LXII (1937) 286.

HOLOTYPE: Hunter's, Paterson's & Williams Rivers, Oct.-Nov. 1804, R. Brown Iter Australiense No. 5763 (BM; photograph only seen).

b. Lomandra longifolia *Labill.* ssp. exilis, ssp. nov.

Holotype: Thredbo R., Mt. Kosciusko, Maiden & Forsyth 1.1899 (NSW 49644).

A typo in habitu minore, in foliis angustioribus et in panicula imminuta differt. Plantae ad ca. 50 cm. altae, foliis plerumque 2-3 mm. latis, 30-50 cm. longis, base marginibus flavirubiginosis paulo laceratis; panicula mascula ad 12 cm. longa, 2-5 cm. lata, glomerulis densis in ramis brevibus paucis, vel interdum ad spicam brevem imminuta glomerulis paucifloris; glomerulorum bracteae quam flores longiores, interdum obscurae.

Differs from the Type in its smaller stature, narrower leaves and reduced inflorescence. Plants often about 50 cm. high with leaves usually 30-50 cm. long and 2-3 mm. broad, their orange to brown base-margins showing more laceration than in the other subspecies. Inflorescence usually a panicle of clusters up to 14 cm. long and less than 2·5 cm. wide with closely spaced clusters on few, short branches, or sometimes reduced to a short spike of few-flowered clusters only a few centimetres long, often orange coloured from the bracts; cluster-bracts exceeding the flowers but sometimes obscure in the denser panicles, 0·6-1·5 mm. long.

Distribution: At higher altitudes in the Tablelands of New South Wales from New England to Victoria where intergradation with ssp. *longifolia* is more common. Victoria: Mt. Stanley, McBarron No. 2928, 1.1949 (NSW 49649); Harrietville to Mt. St. Bernard, Tadgell 12.1913 (MEL); Tingiringi Mtn., Bäuerlen No. 158, 1.1889 (MEL); East Gippsland, Sayer (MEL); Gippsland, Howitt 1882 (MEL); Gippsland, Campbell (BRI 020350); Red Jacket Ck., Gargurevitch 1874 (MEL); Genoa Peak, Mueller 9.1860 (MEL); Genoa district, Bäuerlen No. 50, 1885 (MEL); Cann Valley, E. Gippsland, Sayer 1887 (MEL); Upper Yarra, Walter 10.1893 (NSW 49643); Upper Yarra, J. S(taer) 4.1911 (NSW 49647); Buniup Ck., Mueller 11.1854 (MEL, with second label: In campis prope fluvium Tarwin, 11.1854 Dr. M.); In alpibus . . . . . , Mueller (MEL); Port Phillip, Mueller (MEL); Forrest, Otway Ras., Whibley No. 96, 10.1957 (AD; NSW 49650).

7. Lomandra fluviatilis (*R.Br.*), comb. nov.

Xerotes fluviatilis R.Br., Prodr. (1810) 262, Basionym.

X. longifolia R.Br. var. *fluviatilis* (R.Br.) Domin in Bibl. Bot. XX Heft 85^1 (1915) 525.

Holotype: Stony bed of the Grose in dense tufts, 1803-4, R. Brown Iter Australiense No. 5761 (BM; photograph only seen).

Distribution: Central Coast of New South Wales, typically in creek-bed habitats.

The epithet *fluviatilis* has sometimes been applied to the similarly narrow-leaved *L. confertifolia* ssp. *rubiginosa* (see below), a misnomer indeed since that subspecies is typically found on dry, rocky or sandy hillsides. In Queensland the epithet *fluviatilis* has been applied to the broad-leaved *L. longifolia* ssp. *longifolia*.

8. Lomandra confertifolia (*F. M. Bail.*) *A. Fahn* in Journ. Linn. Soc. Lond. (Bot.) LV (1954) 168.

Xerotes confertifolia F. M. Bail. in Qld. Agric. Journ. XXV (1910) 11; F. M. Bail., Compr. Cat. Qld. Pl. (1912) 565 & Pl. 549; Domin in Bibl. Bot. XX Heft 85^1 (1915) 526.

Lectotype here selected: Glasshouse Mountain, F. M. B(ailey) (BRI 020364).

Lectoparatype: Summit of Mt. Cooroy, 11.1892 (BRI 020359), assuming this to be the collection by Bailey & Simmonds.

This population, long known but never reliably named in New South Wales, now proves to be widespread and diverse. It is conspecific with *L. confertifolia*, until now recognised only from south-east Queensland, and is divisible into five subspecies. Two of these subspecies are embraced by the syntype citations and, of the available appropriate specimens, only that selected above is fully suitable as Lectotype. The third of Bailey's syntypes: Mt. Perry, on the tops of the cliffs, Jas. Keys (BRI 020365), belongs to ssp. *pallida* below.

a. **L. confertifolia** ssp. **pallida, ssp. nov.**

HOLOTYPE: Carnarvon Ra., (Leichhardt District), sandstone hills alt. 2,000 ft., growing in rock ledges and crevices, common, White No. 11375, 9.1940 (BRI 020370).

PARATYPE: with same data (BRI 020371).

A typo in habitu subacaule, in surculis crassioribus, in foliis longioribus, vetustioribus non crispis, saepe 30-60 cm. longis, in foliorum basibus non proxime adpressis, aliquanto laceratis in fibras pallidas, raro fuscas; in paniculis pallidis, masculis plerumque amplius 8 cm. longis, ad 2 cm. latis, femineis minoribus sed multifloris, differt.

Differs from the Type in its less extensive stems and often tufted habit, its longer leaves 20-60, usually 30-50, cm. long, 1-2 mm. broad, in the loose arrangement and some laceration of its pale (rarely dark) leaf base-margins, in the absence of marked curling-back in the older leaves and in the larger panicles, the males often 2 cm. broad with cluster bracts more than 1 cm. long.

DISTRIBUTION: Central- and South-eastern Queensland, often in rocky or exposed situations in sandstone hills, grading into ssp. *rubiginosa* in the northern Tablelands of New South Wales. QUEENSLAND: Rockingham's Bay, Dall(achy) (MEL); Table Mt., O'Shanesy No. 1276, 3.1871 (MEL); Spurs of the Drummond Ra., O'Shanesy (MEL); Herbert's Creek, Bowman (MEL); Springsure, Wuth (MEL: 2 sheets, one labelled " 263: grass from the Rocks "); Enniskillen (Mitchell District), White No. 12748, 11.1943 (BRI 020239); Rosedale, Dovey No. 201, 9.1933 (BRI 020243), and Dovey No. M9, received 3.1931 (BRI 020242); Mt. Perry on the tops of the cliffs, Keys (BRI 020365); Carnarvon Ra. (Types), Crow's Nest, N. Darling Downs, White 10.1921 (BRI 020241); Jimba, P. H. (MEL); Ngungun, Glass House Mts., Hubbard No. 3370, 7.1930 (BRI 020246; K); Glass House Mountains, F. Nat. Excursion 9.1909 (BRI 020247); Archer's Station 9.1843 (coll. Leichhardt, MEL); " Dilligrass on the Ranges (sandstone and others), Archer's Hut (? Hat) 9.1843 " (coll. Leichhardt, MEL); " Unga belonging to Dilli, Archers, ? A. R. Rose 25 Aug." (coll. Leichhardt, MEL); " Unga (small leaved Dilligrass), on the Ranges, Archer's Hat, 8.1843 " (coll. Leichhardt, MEL); Swamp of our camp, Durval, 8.1843 (coll. Leichhardt, MEL); Brisbane R., Mueller 7.1858 (MEL); Tambourine Mt., Longman & White 2.1917 (BRI 020240; 020366); Ironbark ridges, Bailey 9.1875 (BRI 020248).

This subspecies is the least clearly defined in the species, showing intergradation not only with its adjacent subspecies, *confertifolia* and *rubiginosa*, but also exhibiting a few phenotypes which make separation from *L. longifolia* occasionally difficult. The latter species includes narrow-leaved forms with smaller male panicles approaching the condition in *L. confertifolia* ssp. *pallida*, though the very small female inflorescence of the latter when present, is sufficient distinction.

b. **L. confertifolia** ssp. **rubiginosa, ssp. nov.**

HOLOTYPE: Berowra, from hillside above the ferry, Lee 18.9.1956 (NSW 49822).

A typo in surculis crassioribus, in foliis base non proxime adpressis marginibus in fibras rubiginosas perlaceratis, vetustioribus non plerumque crispis, perangustis ad 1 mm. latis plus minusve convolutis, glaucis saltem siccis; in paniculis majoribus specie rubiginosa, masculis ad 2 cm. latis, glomerulorum bracteis ad 1 cm. longis tenuissimis differt.

Differs from the Type in its thicker shoots and often less extensive stems (perhaps due to its common habitat in bush-fire areas) sometimes giving a tufted habit, though stems usually more extensive than in ssp. *pallida*; in its very narrow leaves more or less inrolled not closely adpressed at the base where the margins soon lacerate into reddish-brown fibres, dark-green or glaucous when fresh, usually glaucous when dry, often 30-40 cm. long and less than 1 mm. broad, curling back only when very old (i.e. on the longest stems); in its larger panicles or rarely spikes, smaller than in ssp. *pallida*, with a reddish-brown aspect from the floral bracts, and often glaucous rachides, the cluster-bracts very fine and, in the male, up to 1 cm. long.

DISTRIBUTION: Central Western Slopes and Tablelands, and lower North Coast to South Coast of New South Wales, usually in rather dry situations in open sclerophyll forest.

This subspecies shows intergradation with ssp. *pallida* in the north of New South Wales, and in the far South Coast there is some indication, in the few specimens available, of a similar relationship with ssp. *leptostachya*. It has been confused, in New South Wales, with *L. fluviatilis*.

c. **L. confertifolia** ssp. **similis, ssp. nov.**

HOLOTYPE: Benandara State Forest, Bateman's Bay, Constable 13.12.1950 (NSW 16604).

In surculis tenuibus typo persimilis; in foliorum marginibus base adpressis non laceratisque sed rubiginosis, foliis planis 0·5-1·5 mm. latis, 7-17 cm. longis, summo fuscis, bracteis floralibus rubiginosis, glomerulorum bracteis quam flores longioribus sed inconspicuis ad 4·5 mm. longis, rubiginosis, differt.

Very like the Type in its slender, extensive stems with the old leaves curling back, but differing in the red-brown colour of its adpressed, non-lacerate leaf base-margins, in the dark brown tips of its leaves, in the red-brown colour of the floral bracts and in the inconspicuous red-brown cluster bracts only slightly longer than the flowers. Its shorter, flatter leaves which are usually shortly bidentate at the tip, and its much shorter cluster bracts, distinguish it from sspp. *pallida* and *rubiginosa*.

DISTRIBUTION: South Coast of New South Wales.

d. **L. confertifolia** ssp. **leptostachya, ssp. nov.**

HOLOTYPE: Dry Creek, Womboyn-Prince's Highway road, Constable 12.10.1954 (NSW 30153).

A typo in habitu subacaule, in paniculis angustissimis vel plerumque spicis floribus in glomerulis perpaucifloris vel solitariis, glomerulorum bracteis brevibus, et in pedunculis quam inflorescentem multo longioribus differt.

Differs from the Type and ssp. *similis* in its very slight stem development, its tufted habit with condensed, suberect stems; the very narrow panicle or, usually, spicate inflorescence, much shorter than its peduncle, distinguishes it from the other subspecies.

DISTRIBUTION: South Coast of New South Wales, and north-eastern Victoria. VICTORIA: Mt. Kaye, East Gippsland, Willis 10.1948 (MEL).

9. Lomandra spicata, sp. nov.

Holotype: Mt. Lindsay slopes, Constable 11.11.1952 (NSW 23729).

Misapplied Names: This species has been known erroneously for many years as *Lomandra* (or *Xerotes*) *montana* (see below). It is the species described or implied in the following references.

Xerotes longifolia var. *montana* (R.Br.) F. M. Bail. in Qld. Agric. Journ. XXVIII (1912) 203; F. M. Bail., Compr. Cat. Qld. Pl. (1913) 565.

Xerotes montana auct. non R.Br.: Domin in Bibl. Bot. XX Heft 85[1] (1915) 526.

Lomandra montana auct. non R.Br.: Fraser & Vickery in Proc. Linn. Soc. N.S.W. LXII (1937) 285.

Species subacaulis, *L. longifoliae* habitu surculis robustis stipatis, florum glomeratis in spicis, perianthii masculi foliolis solum base conniventibus; foliis lati-linearibus, planis, 4-12 cm. latis, saepe 40-80 cm. longis, tenuioribus quam *L. longifoliae*, plerumque denticulas laterales breves apice acuto excedente, marginibus levibus, base marginibus chartaceis nitentibus fulvis parce laceratis; glomerulis in spicam raro pauciramosam verticillatis, glomerulorum bracteis angusti-linearibus non pungentibus, siccis saepe irregulariter reflexis plerumque 1-2 cm. longis; spicis masculis 10-30 cm. multifloris saepe quam femineos (4-15 cm.) longioribus in pedunculis latis planis quam spicas longioribus, floribus masculis primo cylindricis tum campanulatis in pedicellis minimis in bracteis persistentes floribus casis; perianthii foliolis subaequalibus; capsula primo subcarnosa viridi nitenti tum rubescenti circa 6 mm. longa.

A species with the habit of *L. longifolia* forming large clumps of robust shoots. Leaves broad-linear, flat, thinner and more lax than in *L. longifolia* ssp. *longifolia*, the margins smooth, the apex acute, with a few irregular lateral teeth usually behind it, the bases with shining yellowish to orange-brown chartaceous margins lacerated only in extreme age. Inflorescence a spike of golden-brown clusters fading pale, rarely with a few short branches at the base, the cluster bracts narrow-linear but not pungent and in dried specimens often irregularly bent or reflexed, 0·6-3, often 1-2, cm. long, pale; male inflorescence 10-30 cm., more floriferous and often longer than the 4-15 cm. long female, the spikes shorter than the broad flattened peduncles. Fruit at first somewhat fleshy, green and shining, turning red and drying light to dark brown and slightly wrinkled, about 6 mm. long, tapered from a rounded base.

Distribution: Coast and Tablelands in rain-forest, chiefly in the northern half of New South Wales and in Queensland. Queensland: Kin Kin, Francis & White 3.1916 (BRI 020319); Eumundi, 11.1892 (BRI 020314); Buderim Mt., F. N. Excursion (BRI 020315) and 4.1916 (BRI 020323); Candle Mt., White 5.1918 (BRI 020329); Mt. Glorious, White No. 12068, 3.1943 (BRI 020328); Mt. Glorious, Clemens 1.1948 (BRI 020325); Mt. Mistake (BRI 020317); Mistake Ra., S. E. Queensland, White 11.1920 (BRI 020320); Tambourine Mt., Simmonds 10.1909 (BRI 020318); Tambourine Mt., Longman & White 2.1917 (NSW 49659); Tambourine Mt., White 1.1916 (BRI 020324); Top of Mt. Mitchell, Main Range, White No. 6869 7.1930 (BRI 020327); Top of Mt. Lindesay, Q., Whitehouse 8.1932 (BRI 020326).

10. Lomandra montana (*R.Br.*) *Fraser et Vickery* in Proc. Linn. Soc. N.S.W. LXII (1937) 285 as to basionym, excl. descr.

Xerotes montana R.Br., Prodr. (1810) 262, Basionym; Domin in Bibl. Bot. XX Heft 85[1] (1915) 526 as to Basionym, excl. descr.

X. longifolia var. *montana* (R.Br.) F. M. Bail. in Qld. Agric. Journ. XXVIII (1912) 203 as to Basionym; F. M. Bail., Compr. Cat. Qld. Pl. (1913) 565 as to Basionym.

Holotype: Banks of the River Grose, 1804, R. Brown Iter Australiense No. 5760 (BM: photograph only seen).

Distribution: Near creeks and waterfalls in the Blue Mts., New South Wales.

This species has been seldom collected, the few specimens being included unrecognized in *L. longifolia*, while its name has often been applied erroneously to *L. spicata*.

Other New Taxa (Nos. 11-13)

11. Lomandra bracteata, sp. nov.

Holotype: Yass, Pasture Protection Board Yass 9.1936 (NSW 49458).

Paratypes: Cowra, per Dept. of Agriculture 10.1959 (NSW 49457); Molong, Cleland 10.1913 (AD 95937008).

Species subacaulis, foliis fortibus rigidisque, subplanis, 10-25 cm. longis, 1-2 mm. latis, apice tridentatis, base marginibus tenuibus albis longis in folia ad 10-12 cm. decurrentibus; panicula sessili vel perbreviter pedunculata, inter foliorum bases obscura circa 1-3 cm. longa, floribus masculis et femineis similibus, non glomeratis, campanulatis, albidis, ca. 3 mm. longis in pedicellis 1-2 mm. longis, in axilibus, bractearum albarum magnarum saepe quam flores longiorum, bracteolis similibus minoribus; capsula 5 mm. longa, rugosa.

A tufted, tough-leaved plant with condensed stems, and often congested shoots about 3-8 mm. in diameter. Leaves slightly plano-convex, rigid and very tough, 10-25 cm. long in the few, often imperfect, specimens, 1-2 mm. broad with 12-15 veins, smooth on the margins and surfaces or the margins slightly scaberulous, the apex irregularly 3-toothed but often grazed off, the sheathing bases with conspicuous white membranous margins decurrent for 10-12 cm. along the leaf edge, at least in young growths. Inflorescence, the male and female similar, subsessile and obscure among the leaf bases: a very short panicle of separate flowers, 1-3 cm. long, subtended by broad, acute, white, membranous sheathing bracts exceeding the pedicel and often the flower as well, up to 6 mm. long with a smaller, lateral bracteole near the base of the pedicel; peduncle and rachides smooth, angular. Male flower with perianth segments joined only near the base or below the middle, the outer thinner, narrower and very slightly shorter than the rather fleshy, yellow, more or less ovate inner ones; female flowers similar in shape and size; the perianth segments free, broader at their base and hardening at maturity. Fruit rounded-tetrahedral, about 5 mm. long, much wrinkled.

Distribution: Tablelands to Western Slopes of New South Wales, chiefly in the southern half of the State.

12. Lomandra patens, sp. nov.

Holotype: Palm Valley ca. 125 km. SW of Alice Springs, Hill & Lothian No. 943, 15.7.1958 (NSW 51080). Isotypes: AD 95909101, (K, *fide* label on AD specimen).

Species *L. durae* affinis, floribus glomeratis, glomerulis in panicula magna patentique, masculi perianthii foliolis base ad 1 mm. conniventibus; surculis ad 3 cm. diam., foliis tenuibus, rigidis, siccis glaucis, planis vel involutis, apice subacutis plerumque fissis ad ca. 1 cm., base marginibus albidis, vetustioribus fulvis laceratisque, saepe in laminam decurrentibus, laminae marginibus levibus; paniculis masculis et femineis similibus, 25-60 cm. longis, glomerulis paucifloris distantibusque in rachillis tenuibus verticillatis, pedunculis levibus vel subscaberulis tanquam rachidibus, 11-15 cm. longis; floribus masculis 4-6 mm. longis in pedicellis brevissimis. 0·3-2 mm. longis; capsula ca. 6 mm. longa parce rugosa.

A species with the habit and some other characters of *L. dura* but larger, the shoots up to 3 cm. in diameter with conspicuously distichous leaves. Leaves rather thin and rigid, glaucous or bluish green and inrolled when dry, perhaps nearly flat when fresh, about 1 m. long and 2·5-5, usually 4-5, mm. broad, the apex rounded-acute with dead tips commonly split for 1 cm. or more, the base-margins at first white, then brownish and lacerate, often decurrent for some distance along the lamina, the margins smooth after its removal. Male and female inflorescences similar: large, spreading panicles 25-60 cm. long, of rather few-flowered, distant clusters on slender verticillate branches, the lowest rachillae usually with 4-5 clusters or occasionally compound with one or a few secondary branches, the peduncle 11-15 cm. long, smooth or faintly scaberulous like the rachides; cluster bracts narrow-deltoid as in *L. multiflora*, the longest up to 2·5 cm. long but often breaking and eroding to a broad deltoid relict, obscure except at the lowest verticills. Male flowers cream coloured, 4-6 mm. long on a pedicel of 0·3-2 mm., the perianth segments joined only near the base, all about equal in length, the outer almost membranous, the inner more yellow, slightly thicker and with incurved tips. Female flowers known only in the very young and fruiting stages, apparently as in *L. dura* or somewhat larger. Fruit about 6 mm. long, somewhat wrinkled, purplish with yellow-brown septal markings, perianth and 1 mm. style both persistent.

DISTRIBUTION: Central Australia to Western Plains of New South Wales. NORTHERN TERRITORY: Palm Valley (Type); Palm Valley, Chippendale 8.1956 (NSW 51079; BRI 006679; NT 2673); Finke R., Kempe 1880 (bis) (MEL); Finke R., Kempe 1889 (MEL); Central Australia, Lemberg 1960 (NSW 52321).

13. **Lomandra leucocephala** (*R.Br.*) *Ewart* ssp. **robusta, ssp. nov.**

HOLOTYPE: Between Euston and Mildura in Victoria, Vickery 8.1946 (NSW 2026).

A typo in habitu robustiore, in foliis longioribus latioribusque, filis paucis non bombicinis, in spicis masculis amplioribus partibus 3-8 plerumque 4-5, in pedunculis levibus, in spicis femineis cylindricis differt.

A generally more robust population in the south and west of the specific range showing intergradation in the Western Slopes of New South Wales with ssp. *leucocephala*. Leaves usually 40-50 cm. long, 1·5-2·5 mm. broad with sparse, pale to yellowish or brownish, usually woolly or fibrous membranous margins (in ssp. *leucocephala* 20-40 cm. long, 1-2 mm. broad with abundant, white, more or less silky margins). Male inflorescence in 3-8, usually 4-5, segments on a glabrous peduncle (1-2 segments on a shortly hirsute peduncle in ssp. *leucocephala*), the female distinctly cylindrical (spherical to shortly cylindrical in ssp. *leucocephala*).

DISTRIBUTION: Western, Central and South Australia, Western Victoria and Far Western Plains of New South Wales usually in sandy habitats. WESTERN AUSTRALIA: Great Victorian Desert, Camp 61 Elder Expl. Exped., Helms 9.1891, (AD 95936070). NORTHERN TERRITORY: Laura Vale, Tietkens 1889 (AD 95936070, mounted with the last); 25 miles W of Hermannsburg, Chippendale 7.1954 (NT 48; NSW 51142). SOUTH AUSTRALIA: Ooldea, Cleland 8.1939 (AD 95941019); Ooldea, White 7.1917 (AD 95935066); 100 miles NW of Oodnadatta, Sheaffe in herb. Rodway No. 9241, 5.1936 (NSW 51137); Gov. N.W. Exped. No. 386, Basedow 1903 (NSW 51136); Pinkawillinie, 35 km. WNW of Kimba, Rohrlach No. 309, 4.1959 (AD 95926022; M; Z; NSW 51135); 5 miles from Wudinna towards Kimba, Caulfield No. 8, 9.1935 (AD 95948009); Balumbah, Freund 8.1935 (AD 95940052); Ardrossan, Tepper (AD 95936071); Nuriootpa, Womersley, 3.1944 (AD 95936067); Truro, Cleland 7.1958 (AD 96021125); Mt. Lofty, Tepper 10.1884 (AD 95939020); Kangaroo Flat, Clark 10.1936 (AD 95940086); Lefevre's Peninsula, Herb. Black 4.1915 (AD 95935070); Grange, Tepper 4.1893 (AD 96021120); Holdfast

Bay—Glenelg, Herb. Tate. 1880 (AD 95936066); Glenelg, Brummitt 5.1893 (AD 95811158); near Henley Beach, Griffith 5.1907 (AD 95935063); Henley Beach, Ising 3.1921 (AD 95952002); Grange Road near reed beds, Herb. Black 8.1906 (AD 95935062); near Largs Bay, 11.1916 (AD 95935065); Semaphore, Ising 4.1919 (AD 95940064); Largs Bay, Ising 4.1922 (AD 95940095); Largs Bay, Cleland 5.1949 (AD 95810060); Port R., Port Adelaide, Cleland 7.1914 (AD 95810061); between Adelaide and Port Adelaide, Mueller (NSW 51142); West Beach, St. Vincent's Gulf, Booth 6.1947 (AD 95936065 and 95936056); Semaphore, Cleland 6.1940 (AD 95941028); Sandhills at Brighton, Ising 4.1937 (AD 95940029); Brighton, Koch 5.1902 (NSW 51140); Berri, Morris 4.1924 (AD 95935067 and 95935068); Berri, Morris No. 1103, 4.1924 (BRI 020340); Berri, Herb. Black 10.1924 (AD 95935069); Berri, Benda 9.1924 (AD 95939021); near Veitch's Well, Adams 4.1921 (AD 95935061); ca. 3·5 km. S of Monash, Eichler No. 13803, 4.1957 (AD 95815044; NSW 51130); Murray R., Staer 4.1911 (NSW 51138); R. Murray Scrub at Mannum, Tate 5.1880 (AD 95936072); Murray Bridge, Tepper 1887 (AD 95939018) and 11.1891 (AD 95939022); Murray Bridge, Ham 3.1921 (AD 95941013); Monarto South, Ising 5.1935 (AD 95942003); Monteith, Sharrad No. 556, 3.1960 (AD 96022096; NSW 51268) and No. 557 (AD 96022097; NSW 51269); Cooke's Plains, Sharrad No. 150, 9.1959 (AD 96022095) and 4.1959 (AD 96028101); Ashville, Wilson No. 1427, 11.1959 (AD 96022067; NSW 51270); between Tintinara & Kingston, Sincock 5.1913 (AD 95935059); Dark Island heath, Specht & Rayson No. 11, 2.1951 (AD 96021027; AD 96021028); Emu Flat, Twenty mile desert, Gill 4.1901 (NSW 51139). Victoria: between Euston and Mildura (Type); Nandaly, Watts No. 362, 9.1917 (NSW 51143) and Watts 9.1918 (BRI 020333); Lake Hindmarsh, Walter 10.1899 (NSW 51145); Wimmera, October, C. W. (MEL).

Lectotype selections (Nos. 14-17)

14. Lomandra sororia (*F. Muell. ex Benth.*) *Ewart* in Proc. Roy. Soc. Vic. XXVIII n.s. (1916) 219; Williamson in Vic. Nat. XLV (1928) 35, Fig. 2; Ewart, Fl. Vic. (1930) 278.

Xerotes sororia F. Muell. ex Benth., Fl. Aust. VII (1878) 100, Basionym.

Lectotype, here selected : Grampians, F. Mueller (K); a probable Isotype, matching this, is at MEL with an additional label: " in heathground near Mt. Abrupt " and " *X. sororia* " in Mueller's hand, which are absent from the sheet at K.

Lectoparatype: St. Vincent's Gulf (NSW 53327), with two field labels: " Inter urbem Gawleri et pagium Lindoc Valley, Sept. 14, 1848 " and " Locis graminosis lapidosis montium Bugle range. Ineunte Nov. 1848 Dr. M.".

In his original publication, Bentham, loc. cit., ascribed the name *Xerotes sororia* to " F. Muell. in Herb. Kew " and cited two collections by Mueller among his syntypes, the Types above. These represent the species known as *L. caespitosa* in South Australia. The other three syntypes do not belong to the same species; they are female, all conspecific, and belong to *L. filiformis*. They are located as follows:—Ad fl. Capaspe (*sic*) in monte McIvor, herb. F. Mueller (K; MEL); Rockingham's Bay, Dallachy (K; MEL; NSW 53328); Bowen R., Qld., Bowman (MEL). Mueller (Fragm. VIII (1874) 208) was correct when he referred the first of these to his *Xerotes Thunbergi* (i.e. *L. filiformis*); Ewart's description of *L. sororia* in Fl. Vic. is derived chiefly from these female syntypes and is thus inaccurate for the species.

Misapplied Name: *Lomandra caespitosa* auct. non (Benth.) Ewart: Black in Fl. S.A. ed. 2 (1943) 189.

Distribution: Mt. Lofty Ranges and South-eastern South Australia, to the Grampians in Victoria; also a single specimen from Western Australia: W. Australia, Oldfield (MEL). The record for Queensland is apparently based on Bentham's female syntypes from that State and is thus an error.

15. Lomandra caespitosa (*Benth.*) *Ewart* in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219; Gardner, Enum. Pl. W.A. (1930) 20; Blackall, W.A. Wildflowers Part 1 (1954) 73.

Xerotes caespitosa Benth., Fl. Aust. VII (1878) 104, BASIONYM.

Xerotes benthamiana W. V. Fitzgerald in Journ. Proc. Mueller Bot. Soc. W. A. I Part 10 (1902) 36. HOLOTYPE: Claremont, W.A., Fitzgerald 9.1901 (NSW 53309; male) and ALLOTYPE female (NSW 53311).

LECTOTYPE, here selected: Albany, F. Mueller (K; ISOTYPE MEL).

LECTOPARATYPE: W. Australia, Drummond No. 817 (K; dup. MEL).

Bentham, loc. cit., noted that his *X. caespitosa* comprised " two varieties " but did not recognise that one of these was conspecific with his *X. sororia.* Four of his syntypes were located: two represent the species known as *L. caespitosa* in Western Australia, the Types above; one (Swan R., Drummond, at K) comprises two pieces of female plant of the previously described *L. micrantha* (Endl. in Lehm.) Ewart (not of *X. Andrewsii* Fitzg., i.e. *L. hermaphrodita* (Andr.) Gardner, as stated by Fitzgerald in Journ. of Proc. Mueller Bot. Soc. W.A. I Part 10 (1902) 37); the fourth syntype (W. Australia, Oldfield, at MEL) appears to be a depauperate plant of *L. sororia* as typified above.

DISTRIBUTION: South of Western Australia, and a single specimen from Echunga, S.A. (AD95802178).

16. Lomandra dura (*F. Muell.*) *Ewart* in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219; Black, Fl. S.A. ed. 2 (1943) 187.

Xerotes dura F. Muell. in Trans. Vic. Inst. (1855) 42, (BASIONYM).

LECTOTYPE: In collinis ante montanos locos urbi Adelaide vicinos. Legi Excurr. Nov. 48 Dr. M. (MEL, male).

LECTOPARATYPES: In itinere montem Mount Remarkable versus. Oct. (MEL, female); Lofty Range in montium lateribus, Jan. 1848, Dr. M. (MEL, 2 specimens, male and female, another label: " . . . . Lofty Ras. Nov. ferd. Mueller ", and a MS. description apparently by Sonder, published by him in Linnaea XXVIII (1856) 219); Lofty ranges, *scripsit* Mueller (NSW 50974); Cudnaka, N. Holl. Austr. October 51, ferd, Mueller (MEL); Gawler-town, *scripsit* Mueller (NSW 50973).

Bentham's placing of *Xerotes dura* and *X. multiflora* in different series of his *Euxerotes* has obscured the close relationship between these species. *Lomandra multiflora* occurs over a wide area from Northern Territory and Queensland to Victoria, and shows great variation in leaf size and surface, size and form of inflorescence, and some variation in length of the male flower's pedicel which is, however, always well developed. *L. dura* on the other hand shows a small range and more constancy in its features such as the diagnostic character of almost sessile male flowers, and the usually short, broad panicle with yellowish aspect often formed on lateral shoots bearing scale leaves only (at least in early stages). There are, however, a very few specimens with the aspect of *L. dura* but with male flowers on pedicels 2 mm. long, suggesting the absence of absolute discontinuity between the species. Identification of female plants sometimes becomes, in practice, a matter of aspect. Because of these difficulties, it is considered advisable to set up a lectotype for *L. dura* which Mueller stated, in general terms, to have come from " Barren localities as well of the mountains as plains in South Australia ". Several sheets are probably part of his syntype collection but the only unquestionably acceptable specimen is that selected above.

17. Lomandra elongata (*Benth.*) *Ewart* in Proc. Roy. Soc. Vic. n.s. XXVIII (1916) 219.

Xerotes elongata Benth., Fl. Aust. VII (1878) 106, BASIONYM.

LECTOTYPE, here selected: Moreton Island in sandy soil, Ferd. Mueller 8.1855 (MEL).

LECTOPARATYPES; New England, Timbarra, C. St(uart) (MEL); New England (Poverty Point), C. St. 701, Oct. (MEL; NSW 50555).

With his original description, Bentham cited some five syntypes, which are not all conspecific, a confusion still obtaining in the relationship of this species with *L. glauca*. Selection of the Lectotypes above leaves two other syntypes which belong to *L. glauca*: Mt. Murchison, Dallachy (MEL; NSW 50568); Murray R., Dallachy (MEL; NSW 50567). I have not seen the remaining syntype, but its locality, Lake Bonney, makes it almost certain to be *L. glauca*.

DISTRIBUTION: *L. elongata*, as typified above, occurs from the Northern Tablelands of New South Wales to south-eastern Queensland, where collector's notes indicate its preference for damp habitats.

Taxonomic and Cytological Notes on *Acetosa* and *Acetosella* in Australia

L. A. S. JOHNSON AND BARBARA G. BRIGGS

SUMMARY

On morphological and cytological grounds the four genera *Rumex* L. s.str., *Acetosa* Mill., *Acetosella* Fourr. and *Bucephalophora* Pau (Polygonaceae) are recognised as distinct. However, it is suggested that *Acetosella* might logically be treated as a section of *Acetosa*. Two species of *Acetosa* are naturalised in Australia, viz. *A. sagittata* (Thunb.) L. Johnson and B. Briggs, comb. nov., and *A. vesicaria* (L.) Á. Löve. Chromosome numbers of Australian material of *Acetosella* from a number of localities have been determined as $2n = 42$ (hexaploid). These plants exhibit fruiting perianth characters hitherto associated with the European diploids recognised as *A. angiocarpa* (Murb.) Á. Löve. Measurements of fruits do not agree with distinctions in published accounts of diploids and hexaploids recognised in Europe as distinct species. Further cytotaxonomic study of the group is necessary. At present, Australian plants can be referred only to the "*A. vulgaris* Fourr. complex". New chromosome counts are reported for *Acetosa sagittata* ($2n = 18$, diploid) and *Rumex brownii* Campd. ($n = 20$, tetraploid).

The genera *Acetosa* and *Acetosella* are recognised as distinct from *Rumex* s. str. by Á. Löve (in Löve and Löve 1948, p. 108). These correspond with groups distinguished by other authors as subgenera, in which rank their delimitation has not been contested. They are sharply separated from *Rumex* s. str. and their segregation leaves the latter as a more coherent group, although by no means a small one. Recent authors (e.g. Rechinger 1958) recognise a fourth subgenus of *Rumex* s. lat., namely *Platypodium*, which had earlier been described as an independent genus, *Bucephalophora* Pau. Its single species, *B. aculeata* (L.) Pau, which has no close relatives, vegetatively resembles *Acetosa* and *Acetosella* but differs in the hardened and toothed fruiting perianth.

Apart from two reported exceptions (Skottsberg 1953), the chromosome numbers known for *Rumex* s. str. are multiples of 10, whereas in *Acetosa* base numbers of 4(5♂), 7 (8♂), 9 and 10 are found (Löve and Löve 1948; Löve and Sarkar 1956). *Acetosella* has the base number $x = 7$ while *Bucephalophora* has $x = 8$. Differences in chromosome size are also reported for these groups. *Rumex* s.str. and *Bucephalophora* are wholly hermaphrodite while *Acetosella* is characteristically dioecious and *Acetosa* includes a variety of sexual conditions (Löve and Sarkar, 1956). Earlier investigations had indicated that the sex-determining mechanism of *Acetosella* was essentially different from that found in dioecious species of *Acetosa*, but Löve and Sarkar have shown that the *Acetosella* mechanism is in fact found in one of the dioecious sections of *Acetosa*. Thus *Acetosella* is not distinguished from the variable genus *Acetosa* by chromosome number or sex-determining mechanism but only by the comparatively minor morphological feature of the unenlarged fruiting perianth. There are good grounds for the recognition of *Acetosa* as generically distinct from *Rumex*. The separation of *Bucephalophora* from *Rumex* is also justifiable and it is probably best maintained as a separate genus which may be rather close to *Acetosa*. It might be more logical to include *Acetosella* as a section of *Acetosa* but, in view of the possible necessity for several new combinations and the unclear specific situation within *Acetosella*, all four genera are recognised here for the time being.

The species of *Acetosa* and *Acetosella* discussed in this paper are naturalised in Australia. No chromosome numbers have hitherto been reported for the indigenous Australian species, all of which belong to *Rumex* in the strict sense. We have found $n = 20$ in *R. brownii* Campd. (Sydney, NSW 60878).

Acetosa *Mill.*

Acetosa sagittata (*Thunb.*) *L. Johnson et B. Briggs*, **comb. nov.**

Rumex sagittatus Thunb., Prodr. Pl. Cap. (1794) 67 (BASIONYM).

No combination under *Acetosa* appears to have been published for this South African species, which is a common and troublesome weed of wasteland and gardens in New South Wales. It has often been misidentified here as the European *A. scutata* (L.) Mill., a species which does not occur in Australia.

The chromosome number of *A. sagittata* has been determined as $2n = 18$ (Northbridge, NSW 60880). No counts have previously been recorded for species of section *Afroacetosae* (Löve and Sarkar 1956).

Acetosa vesicaria (*L.*) *Á. Löve* in Rit. Landbún. Atvinn. Hásk. Reykyavík, ser. B, No. 3 (1948) 108.

Rumex vesicarius L., Sp. Pl. (1753) 336 (BASIONYM).

" *R. roseus* " auct. austral. non L.

This species is naturalised in a number of localities in the drier parts of New South Wales, South Australia and the Northern Territory. It is conspicuous around Broken Hill and Alice Springs. The chromosome number $2n = 18$ has been reported (Darlington and Wylie 1955) but no Australian material has been counted.

Acetosella *Fourr.*

Several authors (Löve and Löve 1948; Clapham, Tutin and Warburg 1952; Lawalrée 1953; Rechinger 1958) currently recognise four species in this group (under *Acetosella* or *Rumex* subgenus *Acetosella*), some or all of which have been included in the past in the concept of *Rumex acetosella* L. (*A. vulgaris* Fourr.) s. lat. Löve (1944) reports four levels of ploidy ($2n = 14, 28, 42, 56$) corresponding to these four species, for which he also gives morphological distinctions. Only *A. vulgaris* Fourr. s. str. ($2n = 42$) and *A. angiocarpa* (Murb.) Á. Löve ($2n = 14$) are directly concerned in the problem of the identity of the plants naturalised in Australia. These are morphologically distinguished in the works cited by characters of the female plants, in particular the nature of the fruiting perianth which is stated to be tightly appressed to the nut in *A. angiocarpa* but loose in *A. vulgaris*. Small differences in relative and absolute nut dimensions are also given.

All except two of the numerous mature female specimens in the National Herbarium of New South Wales (chiefly from New South Wales localities; one Victorian, two Tasmanian) have the perianth tightly adhering to the nut and thus correspond in this feature with *A. angiocarpa*. No chromosome counts have been made on free-fruited material but counts on angiocarpous plants from widely scattered localities have shown that all those examined are hexaploid (Table I).

Mulligan (1959) has similarly reported $2n = 42$ in a plant from Canada with the angiocarpous character, and considers all the material counted by him (apparently including both angiocarpous and free-fruited individuals) to be " simply a hexaploid race of the *R. acetosella* complex, introduced from Europe ".

TABLE I.—MATERIAL STUDIED CYTOLOGICALLY

Locality	*Sex*	*n*	*2n*	*Herb. NSW No.*
Uralla	♀	..	42	60876
Blackheath	♂	21	..	60874
Blackheath	♂	21	..	56863
Northbridge	♂	21	..	56862
Braidwood	♀	..	42	60877
Mt. Kosciusko	♀	..	42	60872
St. Valentine's Peak, Tas.	♀	..	ca. 42	60875

More recently, Löve (in litt. 1962) confirms that the hexaploid number is found in apparently angiocarpous populations in parts of Europe and Canada, but that diploid populations with this character also occur in Canada. He states that " there are variations in the hexaploid material not only in leaf form and growth type but also in the factor of angiocarpy ", that " there can be little doubt that the hexaploid has been produced more than once " and that he has " found such angiocarp hexaploids not only rather widespread in Canada and the U.S.A. but also in the southern and south-eastern parts of Central Europe, though they are always distinguishable from the diploids by the aid of the size of their fruits and their anthers—in addition to some other morphological characters."

Clapham et al. (1952) state that *A. angiocarpa* (" *R. angiocarpus* ") has fruits up to 1 mm. long and " nearly as long as broad " (an inadvertent inversion of words?) while *A. vulgaris* (" *R. acetosella* ") s. str. has fruits ca. 1·5 x 0·8 mm. Rechinger (1958) describes the nut in the former species as about 1·0 mm. in length and in breadth, while in the latter it is 1·3-1·5 mm. long and always longer than broad. No data on absolute anther length have been published and no characters for distinguishing the male plants are given by these authors.

The measurements presented in Table II were made on the material in herb. NSW. " Overseas angiocarpous " includes European as well as North and South American specimens with adherent fruiting perianth and male plants associated with such fruiting specimens. The level of ploidy of these is of course unknown. All Australian male plants are listed under the angiocarpous group. Five observations of each feature were made on each plant of the larger samples and the ranges given are followed by the modal values. A greater number of measurements was made on each of the free-fruited plants cited. Considerable size variations were noted within individual plants.

The data from the Australian angiocarpous material and from the overseas specimens studied are similar and overlap the ranges recorded for both *A. angiocarpa* and *A. vulgaris* but neither group shows a division into two size classes. The samples measured are small but indicate that the mean and standard deviation for fruit length in the known hexaploids do not differ significantly from those calculated for the remainder of the Australian angiocarpous material. Some of these known hexaploids give values closer to those reported for *A. angiocarpa* than for *A. vulgaris*. One of the Australian free-fruiting specimens (NSW 60879) matches descriptions of *A. vulgaris* while the other collection, as well as the single European specimen, is similar in fruit size to that reported for *A. angiocarpa*. The small size of anthers in the Kosciusko specimen may be associated with its monoecious condition and may be irrelevant to present considerations. This individual bears male, female and hermaphrodite flowers.

TABLE II.—FRUIT AND ANTHER DIMENSIONS IN ACETOSELLA

	Australian angiocarpous (18♂, 21♀)	*Overseas angiocarpous* (3♂, 9♀)
Anther length	0·7-1·3 [1·0] mm.	0·9-1·2 mm.
Fruit length	0·9-1·6 [1·2] mm.	1·0-1·5 [1·2] mm.
Fruit length/breadth ..	1·0-1·6 [1·2]	1·0-1·6 [1·2]
	Australian free-fruited	*Overseas free-fruited*
Fruit length	Nowra ♀ NSW 60879 1·0-1·2 mm.	Leiden ♀ van Hattum 4095. 1·0-1·2 mm.
Fruit length/breadth ..	1·0-1·3	1·0-1·2
Anther length	Kosciusko ⚥ NSW 60872 0·8-0·9 mm.	....
Fruit length	(1·0)-1·5-1·6 mm.	....
Fruit length/breadth ..	(1·1)-1·5-1·6	....

As between the hexaploids and diploids, it is evident that any correlation which may exist between ploidal level and the morphological features considered is less simple than has previously been suggested. No comment can be made on the existence of such correlations in the tetraploids and octoploids, which are not represented in Australia.

Further investigation, especially in Eurasia where the plants are native, may reveal a more complex pattern from which a satisfactory taxonomic treatment can be derived. In the meantime no definite recommendation can be made as to the best name for the hexaploid angiocarpous material. It may be as misleading to group all the hexaploids together under *A. vulgaris* as it would be to group all the angiocarpous material (irrespective of chromosome number) under *A. angiocarpa*. Pending further elucidation it is perhaps best to refer this material to the " *Acetosella vulgaris* complex ", on the understanding that this is a convenience, not a solution.

Our thanks are due to Professor Á. Löve of the Université de Montréal for his helpful comments and permission to quote from his letter. Dr. M. E. Phillips of the Parks and Gardens Section, Department of the Interior, Canberra, kindly assisted by obtaining material for study.

LITERATURE CITED

Clapham, A. R., Tutin, T. G. and Warburg, E. F., 1952.—Flora of the British Isles. i-li, 1-1591. Cambridge.

Darlington, C. D. and Wylie, A. P., 1955.—Chromosome Atlas of Flowering Plants. i-xix, 1-519. London.

Lawalrée, A., 1953.—Polygonaceae. In Robyns, W.—Flore Générale de Belgique I, fasc. ii: 171-236. Bruxelles.

Löve, Á., 1944.—Cytogenetic studies on *Rumex* subgenus *Acetosella*. Hereditas XXX: 1-136.

Löve, Á. and Löve, D., 1948.—Chromosome numbers of northern plant species. Rit. Landbún. Atvinn. Hásk. Reykyavík, B-flokkur, No. 3: 1-131.

Löve, Á. and Sarkar, N. M., 1956.—Cytotaxonomy and sex determination of *Rumex paucifolius*. Can. Journ. Bot. XXXIV: 261-268.

Mulligan, G. A., 1959.—Chromosome numbers of Canadian weeds. II. Can. Journ. Bot. XXXVII: 81-92.

Rechinger, K. H., 1958.—Polygonaceae. In Hegi, G.—Illustrierte Flora von Mittel-Europa, ed. 2, III, pt. 1: 352-436. München.

Sarkar, N. M., 1958.—Cytotaxonomic studies on *Rumex* section *Axillares*. Can. Journ. Bot. XXXVI: 947-996.

Skottsberg, C., 1953.—Chromosome numbers in Hawaiian flowering plants. Ark. Bot. III: 63-70.

Calendar of Flowering Times of Some Plants of the Sydney District, Possibly Associated With Pollinosis

DOREEN PRICE

EDITORIAL FOREWORD

The following calendar of flowering times has been compiled by Mrs. Doreen Price over a period of several years while she was engaged in collecting samples of pollen for a Sydney physician specialising in the diagnosis and treatment of allergic complaints.

It appears to be acknowledged that, in order to be a significant cause of pollinosis, a plant must produce a considerable quantity of pollen capable of being liberated into the atmosphere. In general, therefore, the plants listed in the calendar came under the author's notice because she observed that they produced an abundance of pollen, or because they had been recorded in previous literature as being of interest to the medical profession in connection with pollinosis. Further limitation was necessarily imposed by the accessibility to her of plant species for observation.

Mrs. Price brought to this work a keen power of observation and a determination to ensure accuracy of identification of the plants which she handled. Specimens of each were submitted to the National Herbarium of New South Wales for checking, and these form the basis of her records.

The periods of flowering indicated in the calendar represent the periods when Mrs. Price found it possible to obtain abundant flowering material from which pollen could be obtained. They therefore show the main flush of flowering of each species but do not necessarily include the spasmodic or occasional out-of-season flowering which not uncommonly occurs in some species in the Sydney climate. It should be noted that the periods are indicated on an approximate weekly basis by division of each calendar month into four.

The species indicated by an asterisk are those which Mrs. Price has found to produce pollen in greatest abundance.

Not infrequently enquiries are received at the National Herbarium from sufferers from allergic complaints as to plants likely to be flowering at the times when they are afflicted. It is therefore felt that this calendar will provide a useful reference not only to the staff of this institution but to a wider public. It must be clearly understood, however, that inclusion of any plant in this list does not imply any judgment by either Mrs. Price or this institution as to the importance of that plant as a cause of allergic complaints. Such questions are within the province of medical science. It is hoped, however that this list may prove of some service to workers in this medical field who are often handicapped by insufficient access to information concerning the botanical aspects.

Mrs. Price obtained most of her material from the northern suburbs of Sydney but in a very few instances from other parts of New South Wales.

—R.H.A. and J.W.V.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Acacia baileyana* (Cootamundra Wattle) ..							---	----	---			
**Acacia cyanophylla* (Blue Leaf Wattle) ..									-	----	-	
**Acacia decurrens* (Black Wattle)							--	----	--			
**Acacia elata* (Cedar Wattle)	----										--	----
**Acacia floribunda* (White Sally)							-	----	----			
**Acacia glaucescens* (Coastal Myall) ..								--	----			
**Acacia linifolia* (Scrubby Leaf Wattle) ..		--	----	----	----	--						
**Acacia longifolia* (Sydney Golden Wattle) ..							--	----	----			
**Acacia longissima* (Fine Leaf Wattle) ..	---	----	----	--								
**Acacia mearnsii* (Green Wattle)										--	----	
**Acacia myrtifolia* (Myrtle Leaf Wattle) ..								----	---			
**Acacia parramattensis* (Sydney Black Wattle)	----										---	----
**Acacia podalyriifolia* (Queensland Wattle) ..					---	----	---					
**Acer buergerianum* (Three-lobed Maple) ..										--	--	
**Acer negundo* (Box Elder)								--	--			
Acer palmatum (Japanese Maple)									----	-		
**Acetosa sagittata*		----	----	----	--							
Acetosa vesicaria (Wild Hops)								----				
**Acetosella angiocarpa* (Sheep's Sorrel) ..							--	----	----	----	---	
Actinotus helianthi (Flannel Flower)	----									----	----	----

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Agropyron repens* (English Couch Grass)	- - - -	- - - -	- - - -	- - - -						- - -	- - - -	
Agropyron scabrum (Wheat Grass)								- - -	- - - -	- - - -	- -	
Agrostis avenacea (Blown Grass)									- - - -	- - - -	- - - -	
**Agrostis tenuis* (Browntop Bent Grass)	- - - -	-									- - - -	- - - -
Albizia lophantha (Crested Wattle)				- - - -	- - - -	- - - -	- - - -	- - -				
Alphitonia excelsa (Native Red Ash)	- - - -	- - -										
Alternanthera denticulata (Lesser Joyweed)											- - -	- - - -
**Amaranthus hybridus*	- -	- - - -	- - - -	- - -								
Amaranthus spinosus (Needle Burr)										- - -	- - -	
Amaranthus viridis (Green Amaranth)	- - - -	- - - -	- - - -	- - - -								
**Ambrosia psilostachya* (Perennial Ragweed)			- - - -	- -								
**Ambrosia tenuifolia* (a Ragweed)			- - - -	- -								
Ammi majus (Bishop's Weed)	- - - -	- - - -						- - -	- - - -	- - - -	- - - -	- - - -
Amyema congener (a Mistletoe)								- - -	- - -			
Anagallis arvensis (Pimpernel)									- - - -	- - - -		
**Angophora cordifolia* (Dwarf Apple)	- - - -										- - -	- - - -
**Angophora costata* (Rusty Gum, Smooth-barked Apple)	- - - -									- -	- - - -	- - - -
**Anisopogon avenaceus* (Oat Spear Grass)										- -	- - - -	

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Anthoxanthum odoratum* (Sweet Vernal Grass)								--	----	----	---	
Aptenia cordifolia								----				
**Araucaria bidwillii* (Bunya Bunya Pine)									----	--		
Aristida ramosa (a Wire Grass)				----	----							
Artemisia arborescens									----	----	--	
Artemisia vulgaris (Mugwort)			----									
Arundo donax (Reed)			----	----	----							
Asparagus sprengeri								----				
**Aster ericoides* (Michaelmas Daisy)			----	----								
Astroloma humifusum										----		
**Atriplex muelleri*											----	
**Atriplex nummularia* (Old Man Salt Bush)									----	--		
**Avena barbata* (Bearded Oat)							-	----	----	----	--	
**Avena fatua* (Wild Oat)					---	----	----	----	----	----	--	
**Avena ludoviciana* (Yellow Oat)									----	----	--	
Avena sativa (Oat)									----	----		
Backhousia citriodora	----											
Backhousia myrtifolia											----	-

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Banksia aspleniifolia			----	----								
Banksia serrata	----	----	--	--	----							
Banksia spinulosa			----	----	----							
Bauhinia spp.										----	----	-
**Berberis lycium*										----	----	
**Betula pendula* (Silver Birch)									---	--		
**Bidens pilosa* (Pitchforks, Cobbler's Pegs)	----	----	----	----	----	----	----	----	----	----	----	----
Blandfordia spp. (Christmas Bells)	----									--	----	----
Boronia ledifolia							----	--				
Boronia megastigma (Brown Boronia)								----				
Boronia pinnata								----	----			
Bossiaea scolopendria								--	----			
Bothriochloa ambigua (Red Leg Grass)				----	----					--	----	
**Brachychiton acerifolium* (Illawarra Flame Tree)	----	----								--	----	----
Brachychiton discolor (Lace-bark Tree)	----	----									----	----
Brachychiton populneum (Kurrajong)										--	----	--
Brachyloma daphnoides								-	----	-		
**Briza maxima* (Large Quaking Grass)								----	----	--		
Briza minor (Small Quaking Grass)									--	----		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Bromus diandrus* (Giant Brome Grass) ..									- -	- - -		
**Bromus madritensis* (Madrid Brome Grass)										- - - -	- -	
**Bromus molliformis* (Soft Brome Grass) ..									- -	- - - -	- -	
Burchardia umbellata (Milkmaids)								- - - -	- - - -	- -		
Bursaria spinosa (Blackthorn)	- - - -	- - - -										
**Buxus macowanii*								- -	- - - -	- -		
Callicoma serratifolia									- -	- - - -		
Callistemon citrinus (Red Bottlebrush) ..									- - - -	- - - -	- - -	
Callistemon salignus (Cream Bottlebrush) ..									- - - -	- - - -	- - -	
Callistemon viminalis (Weeping Bottlebrush)			- - - -	- - - -	-				- - - -	- - - -	- -	
**Callistephus chinensis* (Annual Aster) ..	- - - -	- - - -	- - - -	-								
**Callitris hugelii* (White Cypress Pine) ..								- - - -	- - - -			
**Callitris rhomboidea* (Port Jackson Pine) ..									- - - -	- - - -	-	
Calodendrum capense (Cape Chestnut) ..	- - - -										- - - -	- - - -
Calotis cuneifolia										- - - -	-	
Calotis lappulacea (Yellow Daisy Burr) ..					- - - -	- - - -						
Capillipedium parviflorum (Scented Top) ..				- - - -	- - - -	- - - -	- - - -					
Capsella bursa-pastoris (Shepherd's Purse) ..							- - - -					
Carissa spectabilis (Wintersweet, Bushman's Poison)									- -	- - - -		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Carya illinoensis* (Pecan)									----	--		
Cassia sp.	----	----	----	----								
Cassytha sp. (Devil's Twine)											----	----
**Casuarina cunninghamiana* (River Oak)		----	----	-								
**Casuarina distyla* (Scrub She-oak)							----	----	--			
**Casuarina glauca* (Swamp Oak)								----	----			
**Casuarina littoralis* (Black Oak)		--	----	----	--							
**Casuarina stricta* (Drooping She-oak)			----	----	-							
**Casuarina torulosa* (Forest Oak)		-	----	----								
Catalpa speciosa											----	
**Caustis flexuosa*		----										
**Cedrus deodara* (Deodar, Indian Cedar)			-	----								
Celtis australis (Hackberry)									----	----		
**Cenchrus australis* (Hillside Burr Grass)		----	----	---								
Centaurea melitensis (Maltese Cockspur)									-	----		
Centaurium minus								---	---			
Cerastium viscosum (Mouse-ear Chickweed)						----	----	----	----	----		
**Ceratochloa unioloides* (Prairie Grass)							-	----	----	---		
Ceratopetalum gummiferum (Christmas Bush)										--	----	

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Cestrum nocturnum*											....	
Chaenomeles lagenaria (Flowering Quince, Japonica)							.	....	....			
**Chamaecytisus prolifer* (Tree Lucerne, Tagasaste)					....	....	....	....	....			
Chamelaucium uncinatum (Geraldton Wax Plant)					....	....	....	....	....			
**Chenopodium album* (Fat Hen, Goosefoot)		..	....	....								
Chenopodium ambrosioides	..	....	....									
Chenopodium murale (Nettle-leaf Goosefoot)	....	....	....	....	....	....						
Chenopodium trigonon									....	....		
**Chloris gayana* (Rhodes Grass)		....	....	....	....							
Chloris truncata (Windmill Grass)		....	....	....	....							
Chloris ventricosa (Tall Chloris)	....	....	....	....								
Chloris virgata (Feather-top Chloris)		....	....	....	....							
**Chrysanthemum frutescens* (Marguerite)								..	....	....	....	
**Chrysanthemum maximum* (Shasta Daisy)	....										....	....
**Chrysanthemum morifolium* (Garden Chrysanthemum)				....	....							
**Chrysanthemum parthenium* (Feverfew)	....	....	....	....	....				....	....	....	....
**Chrysanthemum segetum* (Corn Marigold)			....	....								

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Cinnamomum camphora (Camphor Laurel)									··	····		
Clematis aristata (Traveller's Joy)									···	···		
Clematis glycinoides								···	····			
Clerodendrum tomentosum									··	····		
Coleonema pulchra (Diosma)					··	····	····	····	····	·		
Comesperma ericinum								··	····	··		
Conospermum longifolium							··	····	··			
*_Coprosma repens_ (Looking Glass Bush)									····	····	··	
Coprosma repens cultivar _variegata_									··	····	··	
*_Coreopsis_ sp. (Calliopsis)	····	····	····	····							····	····
Coronopus didymus (Lesser Swinecress)								··	····	···		
Cortaderia selloana (Pampas Grass)			····									
*_Cosmos bipinnatus_	····			····	····					····	····	····
Cotoneaster serotina										·	····	
Cotula australis (Common Cotula)							····	····	····	··		
Crotalaria agatiflora (Bird Flower)	····	····	····	····	····	····						
Cryptocarya sp.			··	····								
*_Cryptomeria japonica_ (Japanese Cedar)				····	····	····	····	····	····	·		
*_Cryptostemma calendula_ (Capeweed)								··	····	····		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Cupressus glabra* (Smooth Arizona Cypress)							----	----	----	----		
**Cupressus sempervirens* (Italian Cypress)								--	----	--		
**Cupressus torulosa* (Nepal Cypress)							----	----	--			
Cyathochaeta diandra											----	----
**Cynodon dactylon* (Common Couch Grass)	----	----	----	----	---				-	----	----	----
Cyperus rotundus (Nut-Grass)		-	----	----				----				
**Dactylis glomerata* (Cocksfoot)	----	---								--	----	----
**Dahlia* (garden hybrids)	----	----	----	--							-	----
**Danthonia* spp. (Wallaby Grasses)									---	----	----	-
Daphne odora					--	----	----	-				
Datura stramonium (Thorn Apple)		----	----	----								----
Daviesia ulicifolia									----			
Dendrophthoe vitellina (a Mistletoe)	----	----	----			--	---	--	----	----		
Deyeuxia appressa									--	----		
Deyeuxia decipiens										----	----	
Deyeuxia mesathera									--	----	---	
Deyeuxia quadriseta (Reed Bent Grass)									----	----	-	
**Dichelachne sciurea* (Short-hair Plume Grass)				-	----	----	----	----	----	----	---	

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
* *Digitaria adscendens* (Summer Grass) . .	----	----	----	----								
* *Digitaria didactyla* (Queensland Blue Couch)	----	----	----	----	----					-	----	----
* *Digitaria sanguinalis* (Summer Grass) . .	----	----	----	----								
Dillwynia retorta (Heathy Parrot Pea) . .							--	----	----			
Dillwynia sericea								----	----			
Diuris aurea									-	----	-	
* *Dodonaea triquetra* (Native Hop Bush) . .		----	-									
Dolichos lignosus									----	----		
Drosera peltata (a Sundew)								--	----			
Drosera spathulata (a Sundew)									----	-		
Echinochloa crusgalli (Barnyard Grass) . .	----	----	----								---	----
Echinopogon caespitosus (Rough Beard Grass)										----	----	
Elaeocarpus kirtonii										---	----	
Elaeocarpus reticulatus (Blueberry Ash) . .										--	----	
* *Eleusine indica* (Crow's-foot Grass)	----	----	----	----	----	----						----
Emex australis (Catsheads, Spiny Emex) . .								--	----	--		
Entolasia marginata (Margined Panic Grass)									----	----		
Eragrostis brownii (Brown's Love Grass) . .										----	-	
* *Eragrostis leptostachya* (Paddock Love Grass)	----	----	----	----	----						---	----
Eragrostis parviflora (Weeping Love Grass)	----	----									---	----

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Erigeron bonariensis (Flax-leaved Fleabane)	----	----	----	----	----	----	--			--	----	----
Eriobotrya japonica (Loquat)					----							
Eriochloa procera (an Early Spring Grass)										----	----	
Eriostemon spp. (Wax Flowers)								----	----			
Erodium moschatum (Musky Crowfoot)								-	----	--		
Erythrina sp. (Coral Tree)				----			--	----	----	----		
Erythrina crista-galli	----	----									----	----
**Eucalyptus gummifera* (Bloodwood)		----	----	--								
Eupatorium adenophorum (Crofton Weed)								--	----	----		
**Euphorbia heliscopia* (Sun Spurge)					----							
**Euphorbia lathyrus* (Caper Spurge)									--	----	----	-
**Euphorbia peplus* (Petty Spurge)	----	----	----			----	----	----	----	----	----	----
Exocarpos cupressiformis (Native Cherry)		----	--						---	---		
Festuca rubra											---	----
Foeniculum vulgare (Fennel)	----	----	----	----	-							----
**Fraxinus oxycarpa* (Desert Ash)			--	----	-							
Fraxinus oxycarpa cultivar "Raywoodii" (Claret Ash)							-	----				
Fumaria spp. (Fumitory)						---	----	----	----	--		
Gaillardia grandiflora (Blanket Flower)	----	----										

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Galinsoga parviflora (Potato Weed)			----								----	----
Genista monspessulara			----						----	----		
Glochidion ferdinandi (Cheese Tree)										----	----	
Glyceria australis	-	----										
Gnaphalium japonicum (Japanese Cudweed) ..								-	----	--		
Gnaphalium luteoalbum (Jersey Cudweed) ..								-	----	--		
Gnaphalium spicatum (a Cudweed) ..	----	----	----		-	----	----	----	----	----	----	----
Gompholobium latifolium (Golden Pea) ..								-	----	--		
Grevillea buxifolia (Grey Spider Flower) ..		----	----	----				----	----	----	--	
Grevillea robusta (Silky Oak)									---	----	----	--
Grevillea rosmarinifolia								----	----			
Hakea sericea							----	----				
Hardenbergia violacea (False Sarsaparilla) ..								----	----	----	----	
Hedera helix (Ivy)		----	----									
Helichrysum apiculatum (Yellow Buttons) ..							-	----	----	----		
Helichrysum diosmifolium (Sago Bush) ..										----	----	----
Hemarthria compressa	----	----	--									
Hibbertia billardieri								--	----	--		
Hibbertia stricta								--	----	--		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Holcus lanatus* (Yorkshire Fog)									-	----	----	----
Hordeum leporinum (Barley Grass)							----	----	----	--		
Hydrangea macrophylla										-	----	----
Hymenosporum flavum (Native Frangipani)										---	----	-
Hypochoeris radicata (Flat Weed, Cat's-ear)		----	----	----	----	--	--	----	----	----	----	----
**Imperata cylindrica* var. *major* (Blady Grass)			----	----	----	----	--		-	----	----	--
Inula graveolens (Stinkwort)		----	----	-								
Isopogon anemonifolius (Drumsticks) ..								----	----			
Jacaranda mimosifolia											---	----
Kennedia rubicunda (Red Bean)								----	----	--		
**Kochia scoparia* (Burning Bush)		--	----	----								
Kohlrauschia prolifera (Proliferous Pink) ..								--	----	----		
Kunzea ambigua											----	
Kunzea capitata (Pink Buttons)									--	----		
Laburnum anagyroides (Golden Chain Tree)										----		
Lambertia formosa (Honey Flower)			----	----	----				---	---		
Lamium amplexicaule (Henbit, Deadnettle)..								---	----	--		
Laurocerasus lusitanica (Portugal Laurel) ..									----			
Lepidium hyssopifolium (Peppercress) ..									----	----	----	

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Leptomeria acida (Native Currant)											----	
Leptospermum scoparium var. *rotundifolium*										----	--	
Leptospermum squarrosum (Tea Tree)		----	----	----	----	-						
Leptospermum attenuatum									----	----		
Leucopogon microphyllus									----	---		
**Ligustrum lucidum* (Large-leafed Privet)	----	-										----
Ligistrum ovalifolium var. *aureum* (Golden Privet)											----	----
**Ligustrum pubescens* (Privet)									--	----	--	
Linum trigynum (= *L. gallicum*) (French Flax)											----	----
**Liquidambar styraciflua*									----	---		
Liriodendron tulipifera (Tulip Tree)										--	--	
**Lolium loliaceum* (Rigid Rye Grass)									-	----	--	
**Lolium perenne* (Perennial Rye Grass)									----	----	---	
**Lolium temulentum* (Darnel)									----	----	---	
Lomatia silaifolia (Wild Parsley)	----	----										
Lonicera japonica (Honeysuckle)										--	----	
**Lupinus angustifolius* (New Zealand Blue Lupin)									----	----	----	----
**Macadamia tetraphylla* (a Macadamia Nut)									----	----		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Magnolia grandiflora*	----										---	----
**Magnolia soulangeana*								--	---			
Malva parviflora (Small-flowered Mallow)							----	----				
Mangifera indica (Mango)										--	----	
Marrubium vulgare (Horehound)						----	----	--	--	----	----	
Medicago sativa (Lucerne)	----	-									----	----
**Melaleuca bracteata*										----	---	
**Melaleuca hypericifolia*		----	---							----	---	
**Melaleuca linariifolia*										----	---	
**Melaleuca quinquenervia* (Paper Bark Tea Tree)			--	----								
**Melaleuca trichostachya*										----	---	
**Melia azedarach* var. *australasica* (White Cedar)									--	----		
**Melilotus indica* (Hexham Scent)						----	----	----	----	----	---	
Metrosideros excelsa (New Zealand Christmas Tree)											---	---
Micrantheum ericoides									----	----	---	
Microlaena stipoides (Meadow Rice Grass, Weeping Grass)			--	----	----	----				----	----	----
Modiola caroliniana (Red Flowered Mallow)									----	----	---	

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Myrsiphyllum asparagoides (Smilax)								- - - -	- - - -			
Nandina domestica (Heavenly Bamboo)											- - - -	- - - -
Nerium oleander (Oleander)	- - - -			- - - -				- -	- - - -	- - - -	- - - -	- - - -
Notelaea longifolia									- -	- - - -		
Ochna atropurpurea								- - - -				
Oenothera sp. (Evening Primrose)										- - - -	- -	
**Olea africana* (Golden Olive)										- - - -	- - - -	
**Olearia microphylla* (Snow Bush)							- -	- - - -	- -			
**Omalanthus populifolius* (Native Bleeding Heart)								- - -	- - - -	- - - -	- - - -	- - - -
Opuntia stricta (Prickly Pear)			- -	- - - -	- -							
Oxalis corymbosa (Sorrel)					- - - -	- - - -	- - - -	- - - -	- - - -	- -		
**Oxalis pes-caprae* (Sorrel)					- -	- - - -	- - - -	- - - -	- - - -	- -		
Panicum fulgidum (a Panic Grass)										-	- - - -	
Panicum maximum (Guinea Grass)										- - - -	- - - -	
**Papaver nudicaule* (Iceland Poppy)				- -	- - - -	- - - -	- - - -	- - - -	- - - -	-		
Parthenocissus quinquefolia (Virginia Creeper)											- -	- - - -
**Parthenocissus tricuspidata* var. *veitchii* (Boston Ivy, Virginia Creeper)											- -	- - - -
**Paspalum dilatatum* (Paspalum)	- - - -	- - - -	- - - -	- -							- -	- - - -

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Paspalum distichum (Water Couch)	----	----	----	----	----	----					---	----
**Paspalum urvillei* (Vasey Grass)					----	-						
Pavetta indica											----	-
Pavonia hastata			----									
**Pennisetum macrourum*	----	----	-									
**Pennisetum villosum* (Long-styled Feather Grass)	----	----	----	----	--							
Persoonia levis (Broad-leaf Geebung)										----	----	
Persoonia pinifolia (Pine-leaf Geebung)	----	----										
Petrophile fucifolia (Conesticks)	----	----										
**Phalaris canariensis* (Canary Grass)									--	----	---	
**Phalaris minor* (Lesser Canary Grass)									--	----	---	
**Phalaris paradoxa*										---	----	
**Phalaris tuberosa* (Phalaris, Toowoomba Canary Grass)											----	--
Photinia glabra cultivar Rubens									---	---		
Phyllota phylicoides								----	----	----	----	--
Phytolacca octandra (Inkweed)			----	----	-			----	----	----		
**Picea* sp. (Spruce)								----	--			
Pimelea linifolia (Slender Rice Flower)	----	----	----	----	----	----	----	----	----	----	----	----

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Pinus pinaster* (Cluster Pine)								---	--			
**Pinus rigida* (Pitch Pine)										----		
**Pistacia chinensis*									--	----		
Pittosporum eugenioides								--	----	--		
Pittosporum undulatum								---	----			
**Plantago lanceolata* (Plantain, Ribgrass)	----					----	----	----	----	----	----	----
**Plantago varia* (Variable Plantain)			-	----				----	----	----	----	----
**Platanus hybrida* (Plane Tree)								--	--			
Platycladus orientalis (Chinese Arbor Vitae)							----	----	----			
**Poa annua* (Winter Grass)					--	----	----	----	----	--		
**Poa pratensis* (Kentucky Blue Grass)									--	----	----	--
**Poa* sp. (Tussock Grass)										--	----	--
Polygonum aviculare (Wireweed)											----	
Polypogon monspeliensis (Annual Beard Grass)										----		
Pomaderris ferruginea								--	----			
**Populus deltoides* (Cottonwood)								--	----			
**Populus* hybrid								--	----			
**Populus nigra* var. *italica* (Lombardy Poplar)								--	----			
**Populus tremula* (Aspen)									----			

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Prostanthera ovalifolia (Purple Mint Bush) . .									- - - -	- -		
Psoralea affinis (Scrubby Pea)									- - - -	-		
Ptilanthelium deustum							- - - -	- - - -				
Pultenaea hispidula									- - - -			
Pultenaea polifolia									- - - -	-		
Pultenaea stipularis									- - - -	-		
Punica granatum (Pomegranate)											- - -	- - -
**Quercus dentata* (Evergreen Oak)									- - - -			
**Quercus palustris* (Pin Oak)									- -	- -		
**Quercus robur* (English Oak)									- - - -			
**Quercus virginiana* (Live Oak)									- -	- - - -		
Randia fitzalanii											- - - -	
**Ranunculus repens* (Buttercup)									- - - -	- - - -		
**Ranunculus lappaceus* (Buttercup)							- - - -	- - - -	- - - -	- - - -	- - - -	
Reseda lutea (Cut-leaved Mignonette) . .										- - - -		
**Rhagodia baccata*		- - - -	- - - -	- - -								
Rhagodia nutans	- - - -	- - - -	- - - -	- -						-	- - - -	
Rhamnus alaternus								- -	- - - -			
**Rheum rhaponticum* (Rhubarb)							- - - -		- - - -	- - - -		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Rhynchelytrum repens* (Natal Grass) ..	----	----	----	----	----	----					----	----
**Ricinus communis* (Castor Oil Plant) ..			----	----	--							
Robinia pseudoacacia									----	----		
Rubus parvifolius (a Native Raspberry) ..											----	
Rubus vulgaris (Blackberry)	----									----	----	----
Rumex brownii (Swamp Dock)	----	-	-	----	----	----	----	----	----	----	----	----
Rumex conglomeratus (Clustered Dock) ..											----	----
**Rumex crispus* (Curly Dock)								--	----	----	----	----
**Sabina procera* (African Juniper)							----	----	-			
**Salix caprea* (Pussy Willow)								----	--			
Sambucus nigra (Elderberry)								-	----			
Sapium sebiferum (Chinese Tallow Tree) ..		---	----									
Sarothamnus scoparius (Broom)									--	----	----	----
Schefflera elliptica								--	----			
**Schinus molle* (Pepper Tree)	----	----		----	----	----		----	----	----	----	----
Senecio vulgaris (Common Groundsel) ..						-	----	----	----	----	----	----
**Setaria geniculata* var. *pauciseta* (Slender Pigeon Grass)	----	----	----	----	----						--	----
**Setaria glauca* (Pale Pigeon Grass)	--	----	----	----	----	-						

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Sida rhombifolia (Paddy Lucerne, Common Sida)	----	----	----	----	----	-				-	----	----
Silene anglica (Catchfly)									----	----		
**Silybum marianum* (Variegated Thistle)								--	----	----	--	
Solanum nigrum (Black-berried Nightshade)								--	----	--		
**Solidago canadensis* (Golden Rod)				----								
**Sorghum halepense* (Johnson Grass)	----	----	----	----	---					----	----	----
**Sorghum leiocladum* (Native Sorghum)		--	----	--								
Sporobolus diander										----	-	
Stachys arvensis (Stagger Weed)				----		----	----		----	-		
Stellaria media (Chickweed)					----	----	----	----	----			
Stipa scabra (Rough Spear Grass)										----	----	--
Stypandra glauca (Nodding Blue Lily)								-	----	----	--	
**Syncarpia glomulifera* (Turpentine Tree)									----	----	--	
Tagetes minuta (Stinking Roger)			--	----	----							
Tamarix spp.	----								----	----	----	----
**Tanacetum vulgare* (Common Tansy)		-	----	-								
Taraxacum officinale (Dandelion)	----	----				----	----	----	----	----	----	----
Telopea speciosissima (Waratah)								-	----	--		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
Tetragonia tetragonioides (New Zealand Spinach)										- - - -		
Tetrapanax papyrifer (Rice Paper Plant) ..					- - - -	- - - -						
Tetrarrhena juncea	- - - -									-	- - - -	- - - -
Thalictrum dipterocarpum (Lavender Shower)			- - - -	- - -								
Thelymitra ixioides								- - - -	- - - -			
Thelymitra venosa (Veined Sun Orchid) ..								- - - -	- -			
**Themeda australis* (Kangaroo Grass) ..	- - - -	- - - -	- - - -	- - - -	- -				- - - -	- - - -	- - - -	- - - -
**Tilia europaea* (Linden, Lime)											- -	- - - -
Toxicodendron succedaneum (Rhus)									-	- - - -	-	
Trifolium arvense (Hare's-foot Clover) ..			- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	
Trifolium pratense (Red Clover)									- -	- - - -	- -	
Trifolium repens (White Clover)								- - - -	- - - -	- - - -	- -	
**Tristania conferta* (Brush Box)	- - - -									- -	- - - -	- - - -
Ulex europaeus (Gorse)								- -	- - - -	- - - -	-	
Ulmus parvifolia (Chinese Weeping Elm) ..	- -	- - - -										
**Ulmus procera* (Elm)								- -	- -			
Urtica incisa (Scrub Nettle)	- - - -											
Urtica urens (Stinging Nettle)								- - - -	- - - -	- - - -		

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
**Verbascum virgatum* (Twiggy Mullein)	----										----	----
Verbena officinalis (Purple Top)	----										----	----
Veronica persica (Creeping Speedwell)									----	----		
Viminaria juncea (Wild Broom)									--	----		
Virgilia oroboides	----	----	----					----		----	----	----
Vitex lucens (Puriri)								-	----			
Vittadinia triloba (Fuzzweed)						----	----	--				
Vulpia bromoides (Rat's-tail Fescue)									--	----	---	
Vulpia myuros (Rat's-tail Fescue)									--	----	---	
Westringia rosmariniformis (Coast Rosemary)					-	----	----	-				
**Xanthium spinosum* (Bathurst Burr)	----	----	----									
Yucca sp.	----	--		----								
**Zea mays* (Maize)	----								--	----	----	----
Zieria smithii (Stinkwood)									----			----

Dryopoa, a New Grass Genus Allied to *Poa*

JOYCE W. VICKERY

In the course of systematic studies on the Australian species of *Poa* it became evident that it was difficult to place in any available genus the grass species originally described as *Festuca dives* F. Muell. in 1863. This species was later transferred to *Glyceria* as *G. dives* (F. Muell.) F. Muell. ex Benth. in 1878 and to *Poa* as *P. dives* (F. Muell.) F. Muell. in 1882. Some years ago Dr. C. E. Hubbard, Royal Botanic Gardens, Kew, pointed out to me that this grass exhibited features not characteristic of any of these genera.

From *Festuca* it differs notably in that the lemmas are slightly laterally (not dorsally) compressed though scarcely keeled and broader in proportion to their length, and in the hilum being only about one-third as long as the grain.

In general aspect the spikelets of *Festuca dives* resemble those of some species of *Poa* but it differs in the apex of the ovary being hairy with minute stiff hairs while the hilum is linear-elongate (not punctiform). The lemma is only slightly laterally compressed and not prominently keeled and at its hyaline apex sometimes bears a minute delicate and fragile awn (best seen in immature spikelets since it is often damaged before maturity). The blades taper to an acute or acuminate apex (not abruptly pointed as in *Poa*) and the long membranous ligule is striate with delicate nerves. The habit is unlike *Poa* in the coarse, almost reed-like, tall, leafy culms without development either of rhizomes or a dense tussock of leaves.

From *Glyceria* it differs in the open leaf-sheaths, the two free, thinly membranous, bifid, pointed lodicules (not connate, truncate and fleshy), in the hilum much shorter than the grain, in the lemmas being slightly laterally compressed and only 5-nerved with the nerves less prominent, and in the non-aquatic habit.

The hairy ovary and nervose ligule resemble those of *Graphephorum festucaceum* (Willd.) A. Gray (= *Scolochloa festucacea* (Willd.) Link), the only representative of this northern circumpolar genus I have been able to examine, but the spikelets differ in their much shorter glumes relative to the florets, and in the firmer, slightly laterally compressed lemmas which are broader in comparison with their length.

The ovary lacks a terminal appendage above the insertion of the styles as occurs in *Bromus* and related genera.

Dryopoa, gen. nov.

Genus novum *Poa* L. affine, sed ovario ad apicem minute piloso, hilo lineare-elongato, lemmate paululum latere compresso et interdum ad apicem minute aristato, ligula nervata, elongata, laminae ad apicem acutum vel acuminatum attenuatae, culmis crassis proceris facile compressis.

Spiculae similes hermaphroditae 3—7-flores, floribus summis aliquando reductis, latere compressae, breviter pedicellatae, singulatim ad apices ramulos multos paniculae magnae diffusae natae. Rhachilla supra glumas et inter lemmata articulata. Glumae plus minusve persistentes, haud aristatae, inaequales, inferiore quam superiorem breviore, 3-nervatae, cymbiformes, carinatae, acutae, firme membranaceae vel chartaceae, quam florem inferiorem breviores. Lemmata 5-nervata, haud aristata vel nervo medio in arista minuta fragile producta, ab latere lanceolata, explanata elliptico-oblonga, turgidiuscula, parce carinata, ad dorsa firma, ad margines apicesque firme membranacea vel chartacea, facile decidua. Paleae 2-carinatae, lemmata subaequantes. Lodiculae 2, hyalinae, obliquae, inaequaliter bifidae, lobis acutis vel tenuiter attenuatae. Stamina 3. Ovarium breviter oblongum, ad apicem truncatam stigmatibus lateralibus. Caryopsis oblanceolato-oblongus, profunde sulcatus, ad apicem minute pubescens, quam hilum linearem ca. triplo longior. Embryo parva, basalis. Gramen perenne culmis erectis foliatis fistulatis. Species unica.

Dryopoa dives (*F. Muell.*) n. comb.

BASIONYM: *Festuca dives* F. Muell., Fragm. Phyt. Austral. III (1863) 147 and VIII (1873) 129.

HOLOTYPE: "In collibus silvaticus inter flumina Tarwan et Bunyip Creek. F.M(ueller)." A duplicate labelled " Shady Ranges near the Bunip (sic) Creek, F. Mueller, 1.1873 " has been seen at Kew.

SYNONYMS: *Glyceria dives* (F. Muell.) F. Muell. ex Benth., Fl. Austral. VII (1878) 659; J. Vickery in Contrib. N.S.W. Nat. Herb. II (1953) 87. *Poa dives* (F. Muell.) F. Muell., Syst. Cens. Austral. Pl. (1882) 134; F. Muell., Fragm. Phyt. Austral. XI (1881) 130, nomen; F. Muell., Second Syst. Cens. Austral. Pl. (1889) 226.

Tall, coarse, forest grass, usually 1·5-3 m. high, with a loosely tufted perennial rootstock with extravaginal innovations. Culms hollow, more or less compressible, up to 10 mm. diameter, smooth, glabrous, about 5-noded. Nodes glabrous, the lower sometimes geniculate. Sheaths open to the base with overlapping margins, loose upwards, striate, glabrous. Ligule firmly membranous to chaffy, obtuse, laciniate, 8-20 mm. long, distinctly striate with many nerves. Blades linear, flat, or loosely folded on drying, strongly many-nerved, the midrib prominent below, up to 50 cm. long and 7-18 mm. broad, scabrous on the margins and nerves, somewhat auriculate at the base, slightly narrower at the base than the sheaths, gradually tapering upwards to the long acute or acuminate apex. Panicles broadly pyramidal, 20-50 cm. long with distant fascicles of 3-8 spreading branches on a rather stout axis, the branches unequal, up to 25 cm. long, bare and unbranched in about the lower half, scabrous, slender, sparingly branching upwards, the spikelets on long pedicels, the branches and pedicels very scabrous. Spikelets about 9 mm. long, 3- to 7-flowered, greenish or purplish, laterally compressed. Glumes unequal, 3-nerved, cymbiform, keeled, scabrous on the keels and lower margins, acute, firmly membranous to scarious, the lower about 3-5·5 mm. long, the upper about 4-7 mm. long, a little shorter than the adjacent lemma. Callus shortly hairy with straight hairs. Rhachillae smooth or scabrous. Lemma lanceolate from side view, elliptical-oblong when flattened, very firm, turgid, scarcely keeled, coarsely scabrous, 5-nerved, thinner towards the margins and at the delicate erose apex, the midnerve sometimes separating from the adjacent delicate tissues as a minute awn at or below the tip (this condition seen chiefly in very immature spikelets but seldom evident in mature spikelets), 4-5·5 mm. long, with a few hairs at the base on the lateral nerves. Palea subequal to the lemma, rather firm and lightly scabrous on the back, ciliate on the keels in the upper three-quarters, with thinner to hyaline margins and apex. Lodicules hyaline, often bilobed with the lobes unequal, oblique, the shorter lobe often finely aristulate, the longer acute or acuminate, about 1·5 mm. long. Anthers about 3 mm. long. Ovary shortly oblong, minutely hairy at the apex. Grain oblanceolate-oblong, deeply furrowed on the inner face, slightly keeled below on the back, minutely stiff-hairy at the apex. Hilum elongate, linear, about one-third as long as the grain.

Occurs in the tall wet sclerophyll forests of the coastal ranges of south-eastern Australia, from the Illawarra district of New South Wales to Tasmania; not common.

SPECIMENS EXAMINED: NEW SOUTH WALES: Macquarie Pass, in forest towards summit, J. Vickery 30.3.1950 (NSW 53099); Robertson, P. A. Quirk 11.1907 (NSW 53088); Endrick State Forest, Sassafras, F. A. Rodway 2.1942 (NSW 53095); Currockbilly Mt., near Braidwood, J. L. Boorman 12.1915 (NSW 53098); Mt. Currockbilly, 2,000 feet, F. A. Rodway 29.1.1940 (NSW 53094, 53101); N of Milton, F. A. Rodway 1.8.1937 (NSW 53096); Milton, under the shoulder of the Currockbilly Range, R. Pearman 12.1909 (NSW 53087, 53092); Table Mountain, Milton, R. H. Cambage No. 4027, 27.12.1913 (NSW 53097); Little Forest, 5 miles W of Milton, F. A. Rodway No. 2544, 1.8.1937 (K). VICTORIA: Dividing Ranges, C. Walter 2-3.1883 (NSW 53084); Gembrook, H. B. Williamson 14.12.1929 (K); Cement Creek, Dandenong R., S. T. Blake No. 7238, 19.1.1935 (K); near Dandenong Ranges, S. G. Hannaford (NSW 53085); Kallista, Dandenong Range, J. Vickery 23.1.1935 (NSW 17971); Kalorama, Dandenong Range, H. Flecker 22.1.1946 (NSW 53093); Donna Buang, 4,000 feet, A. Meebold 1.1929 (K); Black's Spur, R. A. Black 28.1.1936 (K); Sassafras, A. Meebold 12.1928 (K); Noojee, A. Meebold, No. 21900, 1.1937 (NSW 53091); Shady Ranges near the Bunip Creek, F. Mueller (K); Acheron Way, comm. E. J. Sonnenbery 1.1934 (K); Acheron Way, in moist forest, J. Vickery 19.1.1935 (NSW 17970); Upper Yarra, F. Mueller 1877 (K); Upper Yarra, J. Staer 4.1911 (NSW 53090); Matlock, J. Staer 4.1911 (NSW 53089); S Victoria on hills, A. G. Brown 4.1922 (K). TASMANIA: Snug Plains, 2,500 feet, D. Martin 12.1940 (NSW 53100).

Restio tenuiculmis, a New Species from Eastern Australia

*S. T. Blake

The species described below is common and widely spread in the heath-like communities (" wallum country ") of south-eastern Queensland and north-eastern New South Wales. All collections cited are in the Queensland Herbarium (BRI); isotypes and other duplicates are being distributed to other herbaria.

Restio tenuiculmis *S. T. Blake;* **species nova** affinis *R. pallenti* R.Br. et *R. gracili* R.Br., sed culmis gracilioribus pro more tantum 3-6-nodis, spiculis paucis, glumis angustioribus longe ciliatis, tepalis interioribus floris masculi ± oblanceolatis distinguenda. Typus: Blake 19080 (Holotype: BRI 02822).

Herba dioica dense caespitosa rhizomate brevi ramoso lanato 3-4 mm. crasso. *Culmi* 15-45 cm. longi, 0·6-0·8 mm. crassi, stricti, erecti, teretes, glabri, laeves, simplices vel fere simplices, infra inflorescentiam 3-6 (-10)-nodis. *Vaginae* arctae, convolutae, 10-15 mm. longae, ± purpureo-brunneae, acutae vel obtusae, muticae vel lamina subulata usque ad 10 mm. longa munitae, glabrae vel apice ± ciliatae, florales laxiores acutioresque. *Inflorescentia* 1-3 (-4)-nodes, ex 1-6 (-8) spiculis brunneis ± squarrosis pedicellatis constructa, pedicellis erectis usque ad 15 mm. longis. *Spiculae masculae* ovoideae vel subglobosae, 4-4·5 mm. longi, multiflorae. *Glumae* lanceolatae, acuminatae vel longe acuminatae, in majore parte longe ciliatae, 2·5-3·7 (plurimae circa 3·5) mm. longae, 1·1-1·2 mm. latae. *Flores* 2 mm. longae; tepala 6 quorum 2 exteriora complicata ± spathulata sursum ciliata, tertium planum cultratum suboblanceolatum hyalinum 1-nerve nervo ± duas partes tepali adaequanti sursum ciliatum, reliqua paullo breviora plana oblanceolata hyalina breviter 1-nervia glabra; stamina 3; antherae circa 1 mm. longae; pistillodium minutum. *Spiculae femineae* ellipsoideae 4-5 mm. longae, quam masculae brevius pedicellatae et colore obscuriores. *Flores* 1·8-1·9 mm. longi; tepala 4 glabra quorum 2 exteriora ut in mari complicata, reliqua plana longiora hyalina enervia late lanceolata obtusa; staminodia 2; styli 2 distincti.

Specimens Examined: Queensland: *Wide Bay District:* About midway between Childers and Bundaberg in wallum scrub, Blake No. 15513 & Webb 4.1945 (♂, ♀); Fraser Island, Epps No. 256, 10.1921 (♂), White 10.1930 (♂), Hubbard No. 4634 (♂); mainland opposite southern end of Fraser Island, 0 m., very common, 1.1928, Kajewski No. 15 (♂, ♀); Lake Cootharaba, Keys & Wedd No. 14 (♀), No. 15 (♂). *Moreton District:* Coolum, wallum flats, Blake No. 19080, 11.1952 (♂, ♀, Type); Meridan Plains near Buderim Mt., wallum flats, Blake No. 5216, 2.1934 (♂); Beerwah, drier parts of wallum flat, Blake No. 21031, 10.1959 (♂, ♀), Thorne No. 25129 (♂, ♀), pine plantation, moist sandy wallum 30 m., St. John No. 24462, 12.1950 (♂); Stradbroke Island: White 3.1915 (♀); Sunnybank, Brisbane, in swamp, Blake No. 1311 & C. G. Greenham 5.1932. New South Wales: *North Coast:* Wardell, 10 m. S of Ballina, W. Bäuerlen 11.1893 (NSW 47902; BRI).

This is the smallest and most slender of the Australian species of the genus. Its distinctive characters are the simple, short, slender stems with relatively few (3-6 rarely up to 10) nodes bearing 1-6 (rarely 8) erect, pedicellate, many-flowered spikelets, prominently ciliate glumes with long spreading points, flowers reaching to the shoulders of the glumes with scarcely winged outer pair of tepals, inner tepals of the males ± oblanceolate, 1-nerved with the nerve in most quite short, but those of the females ± lanceolate and more prominently nerved, and 2 stigmas; ripe capsules have not yet been found. The female spikelets are darker in colour than the males, narrower and with shorter pedicels. Some culms of Blake No. 15113 have the lower pedicels ternate; one ♂ culm has 11 spikelets in the inflorescence, one " pedicel " being divided. Male specimens have been collected much more freely than the females. Both sexes are represented on the holotype sheet.

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* Queensland Herbarium, Botanic Gardens, Brisbane.

A Revision of the *Restio gracilis* Complex

L. A. S. Johnson and O. D. Evans

SUMMARY

The eastern Australian species of *Restio* allied to *R. gracilis* R.Br. and *R. australis* R.Br. are described and discussed. Seven species are recognised, including the following newly-described taxa: *R. stenocoleus*, *R. longipes* and *R. fimbriatus*. *R. pallens* R.Br. is reinstated and *R. tenuiculmis* S. T. Blake, described on p. 198 in this issue, is also recognised. Keys and figures for the identification of all species are provided. Certain features of the anatomy of the culms have been found to have taxonomic value, and are described and discussed. Attention is drawn to an apparent case of introgressive hybridisation involving *R. fimbriatus* and *R. stenocoleus*.

For many years there has been uncertainty as to the limits of the species *Restio gracilis* R.Br. and *R. australis* R.Br. in eastern Australia. Preparation of the treatment of Restionaceae for the Flora of New South Wales called for a close study of this complex, and since the results necessitate the description of new species and the presentation of anatomical data, they are here published in the form of a separate revision.

Robert Brown (1810) recognised a third species in this group, namely *R. pallens*, but this was relegated to the synonymy of *R. gracilis* by Bentham (1878) and by Masters (1878), the last monographer, as well as by all subsequent authors. Both Bentham and Masters separated *R. australis* from *R. gracilis* by the lax leaf sheaths and fewer spikelets, but they also stated that in the female flowers of *R. australis* there were three staminodes (or sometimes two, according to Bentham) whilst in *R. gracilis* staminodes were said to be absent. In fact two staminodes are uniformly found throughout the complex. Due to great apparent variations in size, shape and number of spikelets and some variation in shape and size of leaf sheaths amongst the material, difficulty has frequently arisen in assigning specimens definitely to either of the species as hitherto defined.

A closer analysis of the characters of most of the material available in eastern Australian herbaria, of many new collections, and of living plants, has revealed that in fact seven distinct species are recognisable in the complex. Most of them have been referred in the past to *R. gracilis*, but some of the material has led to confusion with *R. australis*. Study of the stem anatomy has been found to provide useful evidence confirming the distinctions between some of the species. This is dealt with below (p. 216). Cytological studies by Briggs (1963) have provided additional differences for two of the species.

Both vegetative and reproductive characters have proved useful in distinguishing the species, as will be seen from the key and notes. There is considerable variability within some of the species but the only intermediates known are the probable hybrids of *R. fimbriatus* and *R. stenocoleus*, discussed under the former species.

All the species treated, except perhaps *R. tenuiculmis* (see p. 198), appear to be fairly closely allied and no question arises of confusion with other species of *Restio*. Each species has a characteristic area of distribution (Figs. 1, 2). These overlap marginally in some cases and two species may at times be found growing together. All the species grow in moist acid soils, frequently sandy or peaty.

R. australis has a wide altitudinal range from sea-level in southern Tasmania to alpine peat bogs in the Australian Alps, but the other species are more restricted in this respect.

A number of specimens of various species were found to be infected by a smut fungus, which appears to cause irregularities of growth, resulting in elongation of the inflorescence and multiplication of the branches, spikelets and parts of the flower. Even apparently hermaphrodite flowers can result. F. Mueller has given manuscript names, as varieties, to some such specimens. The key and descriptions do not cover such aberrant individuals, and the possibility of fungal infection should be borne in mind when specimens which do not fit the key are encountered. A similarly affected specimen of *Restio dimorphus* R.Br., which is not a member of this complex, has been found by Mr. J. Walker of the Biology Branch, New South Wales Department of Agriculture, to be infected by a smut, probably of the genus *Tolyposporium.*

The abbreviations for herbaria used in the citations of specimens are taken from Index Herbariorum (Lanjouw and Stafleu, 1959). All of the species, except *R. longipes*, have been studied in the field and we have examined fresh material of that species also.

The species of the *R. gracilis* complex share the following characters which distinguish them from other eastern Australian species. Culms terete, simple or rarely branched. Inflorescence terminal, the spikelets arranged in a panicle or a raceme or occasionally solitary. A description of the genus *Restio* will be included in the Flora of New South Wales, No. 25. There are indications from anatomy, cytology and other fields that *Restio*, as currently understood, may not be a natural genus, but the Australian species are retained within it for the present.

The species, though distinct, exhibit considerable variability in almost every feature which might be used for key purposes. When using this key, therefore, it will be advisable to consider as wide a range of characters as possible and to check against specific descriptions. Measurements of the diameter of rhizomes are taken to include the clothing of scales. Clear discernment of the position of the stomata requires a magnification of × 20 or preferably more.

1. Leaf blades present on some of the sheaths, small, subulate .... *R. tenuiculmis* 7.

1.* Leaf blades absent.

    2. Sheaths on the upper portion of the culm mostly bearing an apical tuft of fine hairs 1-4 mm. long. Spikelets few, mostly 1-6. Barren and flowering glumes mostly fringed with long fine hairs .... *R. fimbriatus*† 5.

    2.* Sheath apices either glabrous or fringed with downy hairs less than 0·25 mm. long. Spikelets few to many. Barren and flowering glumes either glabrous or the margins sparingly hairy or ciliolate.

        3. Free (non-overlapping) portion of the lowest subtending bract on the axis of the inflorescence gradually tapered to an acute or obtuse apex or if more abruptly tapered then lax, in either case usually longer than the sheathing base and often exceeding the lowest spikelet, the whole appearing more or less lanceolate.

            4. Rhizome 3-4 (-5) mm. diam., with short crowded branches 0·5-2 cm. long, rarely longer. Culms 0·75-1·5 (-1·75) mm., diam., closely arranged on the rhizome. Female spikelets oblong-cylindrical, 6-16 mm. long .... *R. gracilis* 4.

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† Hybrids with *R. stenocoleus* may also fall out here.

4.* Rhizome (4-) 5-10 mm. diam., up to 20 cm. or more in length with few branches. Culms 1-3 mm. diam., usually spaced 1-5 mm. apart on the rhizome. Female spikelets ovoid, 5-7 mm. long.

5. Free portion of the lowest subtending bract on the main axis of the inflorescence broad-lanceolate, tending to embrace the lowest spikelets. Outer surface of the sheaths and bracts rugose-muriculate. Culms up to 3 mm. diam. Stomata on the culm sunken in irregular depressions or rarely in pits .... *R. australis* 1.

5.* Free portion of the lowest subtending bract lanceolate to narrow-lanceolate, not tending to embrace the spikelets. Outer surface of sheaths and bracts not rugose-muriculate. Culms 1-2 mm. diam. Stomata not sunken, or rarely slightly sunken in pits .... *R. stenocoleus*† 2.

3.* Free portion of the lowest subtending bract more or less abruptly tapered to the apex, never lax, shorter or only slightly longer than the sheathing base, only occasionally exceeding the lowest spikelet. Internodes of the axis of the inflorescence often elongated.

6. Spikelets mostly crowded together on the branches or at the nodes of the inflorescence, the exposed portion of the pedicels not exceeding 5 mm. in length. Apices of the subtending bracts reflexed by contact with the lower spikelets. Flowering glumes 2-3·5 mm. long, margins not fringed .... *R. pallens* 6.

6.* Spikelets on the lower part of the inflorescence not crowded, but borne on filiform pedicels or fine branches either of which may reach several cm. in length. Apices of the subtending bracts closely appressed. Flowering glumes 4-6 mm. long, margins sometimes fringed .... *R. longipes* 3.

1. R. australis *R.Br.*, Prodr. Fl. Nov. Holl. (1810) 245; Kunth, Enum. Pl. III (1841) 415; Hook. f., Fl. Tasman. II (1857) 71; F. Muell., Fragm. Phytogr. Austral. VIII (1873) 69; Benth., Fl. Austral. VII (1878) 227; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 254; Moore & Betche, Handb. Fl. NSW. (1893) 443; Rodway, Fl. Tasman. (1903) 236; Maiden & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vict. (1931) 236.

HOLOTYPE: Van Diemen's Land. R. Brown, presumably in BM, not seen. This was seen by Bentham and by Masters and from the description there is no reason to doubt its identity.

Rhizome creeping, short, woolly-hairy, partly covered with broad scarious scales, 0·4-1 cm. diam. over all. Culms erect, unbranched, 50-100 cm. tall, 1·5-3 mm. diam. Sheaths 1-3 cm. long, obtuse or acute, lax on the upper portion of the culm, appressed lower down. Principal subtending bracts on the axis of the inflorescence appearing broad-lanceolate to lanceolate, 4-7 mm. wide, 1·5-3 cm. long, acute or obtuse, often longer than the spikelets and embracing them, glabrous, the outer surface together with that of the sheaths striate and rugose-muriculate. Stomata sunken. Spikelets 2-15, rarely 1 only, shortly pedicellate, arranged in a raceme or narrow reduced panicle, the whole 2-6 cm. long; spikelets of both sexes similar in shape, ovoid, 5-10 mm. long. Outer barren glumes of the spikelet usually slightly fringed with hairs; flowering glumes 4-6 mm. long, ovate to lanceolate, with a long fine point; margins sometimes fringed. Male flowers: tepals 6. Female flowers: tepals 4, rarely 6; staminodes 2; ovary 2-locular, flat; style branches 2, free from near the base. Capsule opening along the edges; seed ellipsoid, brown smooth, ca. 0·8 mm. long. Chromosome No. $2n = 24$ (Briggs 1963). Pl. IV, 3.

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† Hybrid forms with *R. fimbriatus* (p. 212) may also fall out here.

DISTRIBUTION: Central and Southern Tablelands and Snowy Mtns., New South Wales; eastern mountain regions of Victoria; highlands and cooler coastal regions of Tasmania. In wet peaty, sandy or gravelly soil and in swampy places and *Sphagnum* bogs. Fig. 1.

SPECIMENS EXAMINED: NEW SOUTH WALES: *Central Tablelands;* Running Stream, Ilford to Capertee, E. F. Constable 9.6.1961 (NSW 55198); Mt. Cameron, Newnes district, E. F. Constable 11.12.1948 (NSW 7281); Annie Rowan Creek, 12 miles N of Newnes Junction, E. F. Constable 29.7.1960 (NSW 55880); Newnes Junction to Eskbank, A. A. Hamilton 11.1914 (NSW 47836); Mt. Wilson, J. H. Maiden 4.1896 (NSW 47835); Mt. Wilson, J. Gregson 12.1897 (NSW 47834); Mt. Victoria, E. Cheel 12.1900 (NSW 47837); Blackheath, O. D. Evans 3.3.1926 (SYD), 12.12.1961 (NSW 56898); Blackheath, E. F. Constable 21.2.1962 (NSW 57029); Medlow Bath, A. A. Hamilton 11.1914 (NSW 47838); Katoomba, E. F. Constable 29.12.1959 (NSW 53966); Minna Ha Ha Falls, Katoomba, E. F. Constable 26.1.1961 (NSW 53267) and 17.1.1962 (NSW 60800); The Lake, Wentworth Falls, O. D. Evans & D. Blaxell 7.11.1961 (NSW 56433); New Holland, F. Sieber, Agrostotheca No. 33 (MEL); New Holland, F. Sieber, Agrostotheca No. 33 ex herb. A. F. Lang (MEL); Port Jackson district (probably Blue Mtns.) (MEL); Roly Whalan's Swamp, The Boyd Plateau, 5 miles NW of Kanangra Tops, L. A. S. Johnson 4.10.1948 (NSW 47839); The Big Plain, E of Mt. Werong, R. H. Cambage No. 3173, 4.12.1911 (NSW 47840, 48848; SYD). *Southern Tablelands:* Braidwood district, W. Bäuerlen 12.1884 (MEL); Clyde Mountain, E. F. Constable 7.3.1961 (NSW 53505); Clyde Mountain, M. E. Phillips No. 818, 18.4.1961 (NSW 56311); Clyde Mountain, B. G. Briggs 24.12.1961 (NSW 56869); Gudgenby, A.C.T., R. H. Cambage No. 3409, 14.1.1912 (NSW 19859); Kiandra, E. Betche 2.1897 (NSW 47842); Happy Jack's Plain, head of Tumut R., J. C. Newman 1.1952 (NSW 52875); 12 miles NE of Nimmitabel, G. H. Briggs 11.3.1962 (NSW 57026); Mt. Kosciusko, above Hotel, R. H. Cambage 2.1900 (NSW 47844); Smiggin Holes, Mt. Kosciusko, L. A. S. Johnson & E. F. Constable 23.1.1951 (NSW 19337); Mt. Kosciusko, J. H. Maiden 1.1896 (NSW 47845, 47846, 53056); Kosciusko region, F. V. Mercer 2.1946 (SYD); Boggy Plains, Kosciusko region, A. B. Costin 2.1962 (NSW 57042). VICTORIA: Ingeegoodbee River district, W. Hunter 11.1938 (MEL); East Gippsland, Black Watch Creek, C. French 1.1889 (MEL); Gippsland, Howitt (MEL); Australian Alps (MEL); Bogong High Plains, A. J. Tadgell 2.1930 (MEL); Bogong High Plains, C. J. Skewes 1.1953 (MEL); Cobungra, H. B. Williamson 12.1928 (MEL). TASMANIA: near Evandale, 1.1849 (MEL); South Esk near Perth (MEL); Cradle Valley, Cradle Mtns., C. S. Sutton 1.1914 (MEL); Lake St. Clair, R. C. Gunn 7.1.1841 (NSW 47849); Riley's Hut, Lyell Highway, 41 m. Queenstown to Derwent Bridge, R. Carolin No. 1241, 12.1.1960 (SYD); Head of Broad R., Mt. Field National Park, R. Carolin No. 1532, 26.1.1960 (SYD); Adamsfield, 17.12.1942 (HO 3553); Brown Mt. near Campania, R. Jackson 1.10.1951 (HO 3551); Mt. Wellington, Summit, L. Rodway 5.1892 (HO 3550); near Longley, H. D. Gordon 21.8.1937 (HO 3552); road to Taranna State Forest, W. M. Curtis 11.11.1951 (HO 3554); Melaleuca Inlet, Bathurst Harbour, Port Davey, M. Davis No. 1233, 13.3.1954 (MEL); Tasmania, W. H. Archer's Herb. (NSW 47850); Tasmania, C. Stuart (MEL); Tasmania, L. Rodway, 1898 (NSW 47847).

R. australis is a highland plant except in the cooler climate of Tasmania where it extends to southern coastal areas. It is frequently found in and around peat bogs and in other acid, water-logged soils. In places it grows together with *R. fimbriatus* or *R. longipes* but no hybrids have been found; the chromosome number difference would be expected to restrict interbreeding. It shows some individual variation, but no geographic trends are evident, except that in the Blue Mountains area stout forms appear to be absent. It is readily recognised by the broad, lax, rugose-muriculate sheaths and bracts. The shape of the epidermal cells together with the high degree of cutinisation and the deeply sunken stomates distinguish it from all the other species (Fig. 3a). In NSW 56311, from Clyde Mountain, the epidermal depressions tend to be smaller than usual, often with only a single stomate in each. However, the specimen is quite characteristic of *R. australis* in the lax leaf sheaths and in the rugose-muriculate sheath surface. The somatic chromosome number of 24 in *R. australis* is unique in the species-group.

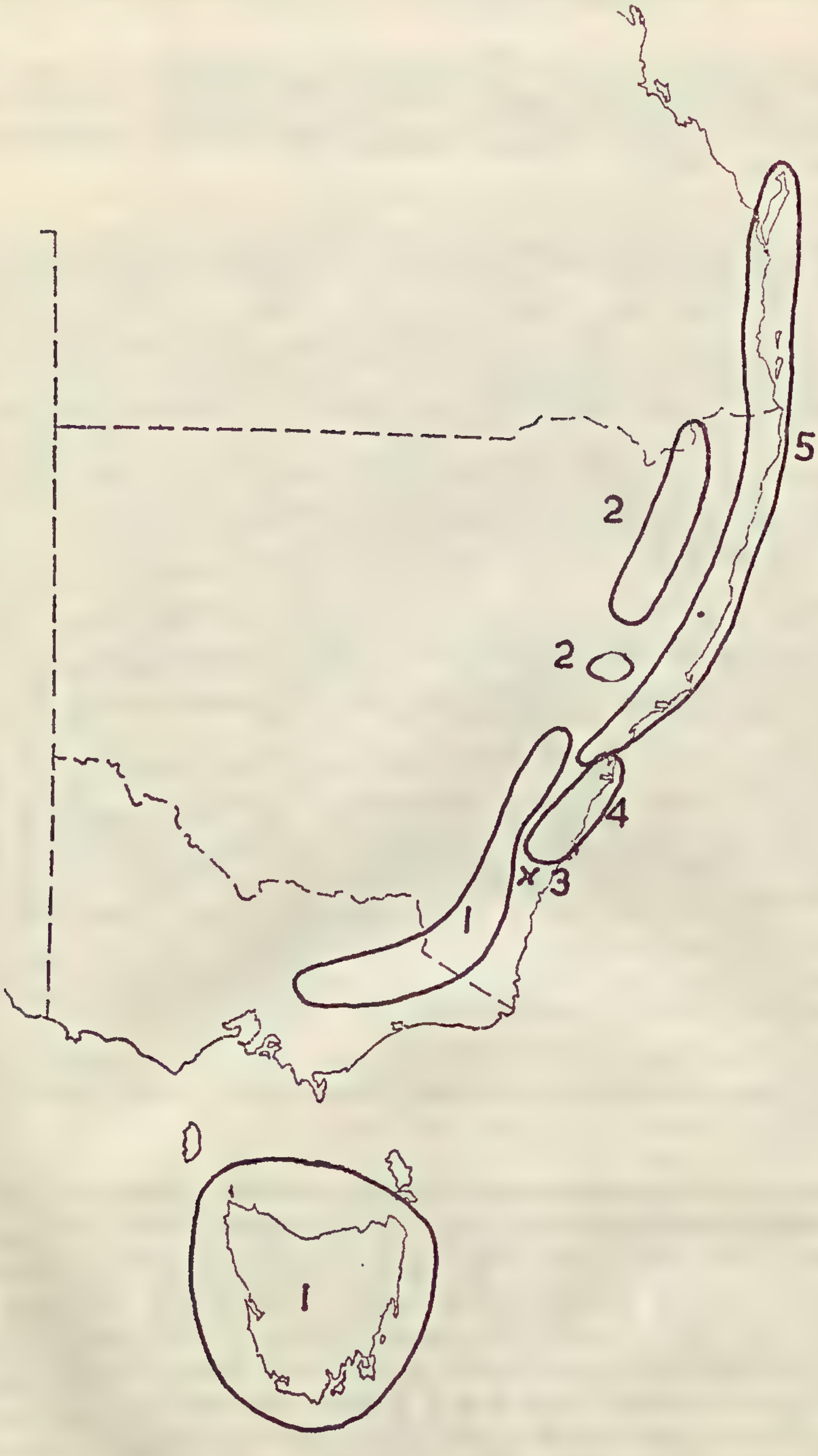


Fig. 1.—Distribution of some *Restio* species: 1. *R. australis*. 2. *R. stenocoleus*. 3. *R. longipes* 4. *R. gracilis*. 5. *R. pallens*.

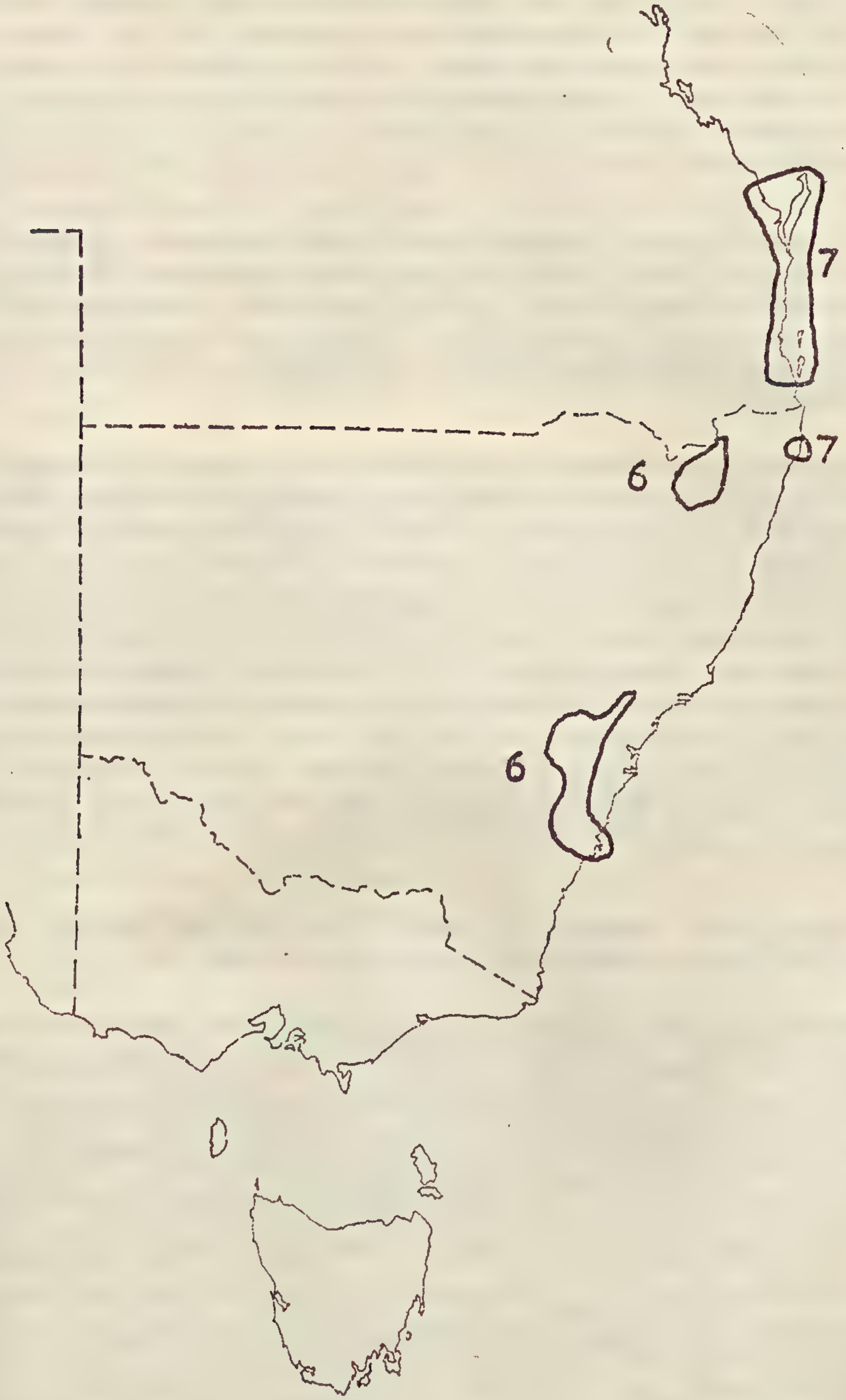


Fig. 2.—Distribution of some *Restio* species: 6. *R. fimbriatus.* 7. *R. tenuiculmis.*

2. R. stenocoleus *L. Johnson et O. Evans,* sp. nov.

Holotype: Bullock Creek, ¼ mile W of Point Lookout turn-off on Armidale to Ebor road, N.S.W., J. B. Williams 14.12.1961 (NSW 53479), female.

Rhizoma repens, breve, lanuginoso-tomentosum, squamis latis scariosis partim indutum, totum 4-8 mm. diametro. Culmi erecti, simplices, 50-150 cm. alti, 1-2 mm. diametro; vaginae omnes arcte appressae, 1-2·5 cm. longae, glabrae vel marginibus ciliatis, acutae vel obtusae. Bractea primaria infima erecta, 1-2 cm. longa, 1·5-3 mm. lata, versus apicem sensim attenuata, nonnunquam spiculam infimam excedens. Spiculae 4-10, saepissime in pedicellis brevibus filiformibus parte exposita quam 1 cm. non longioribus et in panicula angustissima vel racemo plerumque 2-5 cm. longo dispositae. Spiculae masculae ad anthesin globosae, foemineae ovoideae vel ellipsoideae, 5-7 mm. longae, 4-5 mm. diametro. Glumae exteriores steriles spiculae foemineae pilis tenuibus fimbriatae; glumae floriferae 4-5 mm. longae, ovatae, aristulatae marginibus aliquando fimbriatis. Flores masculi: tepala 6. Flores foeminei: tepala 4, staminodia 2; ovarium applanatum, biloculare; ramis styli 2 paene e basi liberis. Capsula applanata marginibus dehiscens; semen ellipsoideum, circiter 0·7 mm. longum, laeve, fuscum. Chromosomata somatica 22.

Rhizome creeping, short, woolly-hairy, partly covered with broad scarious scales, 4-8 mm. diam. over all. Culms erect, unbranched, 50-150 cm. tall, 1-2 mm. diam., sheaths all closely appressed, 1-2·5 cm. long, glabrous or the margins ciliate, acute or obtuse. Lowest subtending bract of the inflorescence erect, 1-2 cm. long, 1·5-3 mm. wide, tapered gradually to the apex, sometimes longer than the lowest spikelet. Spikelets 4-10, mostly on short filiform pedicels the exposed part of which does not exceed 1 cm. in length, and arranged in a very narrow panicle or a raceme mostly 2-5 cm. long. Male spikelets globose at anthesis; females ovoid to ellipsoid, 5-8 mm. long, 4-5 mm. diam. Outer, barren glumes of the female spikelet fringed with fine hairs; flowering glumes 4-5 mm. long, ovate, aristulate, margins sometimes fringed. Male flowers: tepals 6. Female flowers: tepals 4; staminodes 2; ovary 2-locular, flat; style branches 2, free from near the base, capsule flattened; seed ellipsoid, ca. 0·7 mm. long, smooth, dark brown. Chromosome No. $2n = 22$ (Briggs 1963). Pl. III, 2.

DISTRIBUTION: Highlands of southern Queensland and Northern Tablelands of New South Wales, in swampy places on acid soils, Fig. 1.

SPECIMENS EXAMINED: QUEENSLAND: *Darling Downs District*: Stanthorpe, F. M. Bailey No. 138 (BRI 024642); Stanthorpe 6.11.1890 (BRI 024629); Stanthorpe, ex Herb. H. B. Williamson (MEL); 8 miles NE of Wyberba, E. F. Constable 22.3.1962 (NSW 57074); 6 miles NE of Wyberba, L. A. S. Johnson 24.4.1962 (NSW 57085); base of Mt Norman, Wallangarra, M. S. Clemens No. 44699, 2.11.1944 (BRI 017550). NEW SOUTH WALES: *Northern Tablelands:* 12 miles NE of Tenterfield, E. F. Constable 10.5.1961 (NSW 55190); Deepwater R., 3 miles E of Deepwater, E. F. Constable 7.5.1961 (NSW 55188); Gibraltar Range, 43 miles E of Glen Innes, E. F. Constable 5.5.1961 (NSW 55186); Dandahra Creek, north arm, Glen Innes-Grafton road, E. F. Constable 23.3.1962 (NSW 57073); Ryanda, ca. 9 miles N of Guyra, E. N. McKie No. 2478, 20.12.1946 (BRI 024651); Parlour Mts. near Booroolong, M. Gray 5.1.1956 (NSW 47894); Bald Hills Station, Grafton to Armidale, J. H. Maiden 12.1893 (NSW 47905); Dirty Creek, 1½ miles E of Ebor, L. A. S. Johnson & B. G. Briggs 28.1.1962 (NSW 60640, 60642); Snowy Rose, near turn-off for Point Lookout on Armidale-Ebor road, H. St. John No. 24530, 17.12.1950 (NSW 47906); Bullock Creek, near Point Lookout turn-off, Armidale to Ebor road, J. B. Williams 14.2.1961 (NSW 53479) HOLOTYPE; near Point Lookout turn-off, J. B. Williams 23.2.1962 (NSW 60870); near Point Lookout, 45 miles NE of Armidale, G. Davis 7.7.1941 (NSW 49796); Walcha district, H. R. Crawford 6.1900 (NSW 49707); Gloucester Tops, G. H. Briggs 21.4.1962 (NSW 57090); Gloucester Tops, O. D. Evans & I. P. Burgess 22.5.1962 (NSW 61054, 61055, 61056, 61057).

Material of this species has been referred to *R. gracilis* by previous authors but it differs consistently from that species in the shape of the flowering glumes and female spikelets, the thickness of the rhizome and of the culms, and in the

shape, arrangement and walls of the epidermal cells (see p. 216, and fig. 3b). It replaces *R. australis* in the north, differing from that species in the narrow subtending bract, as well as in the stem anatomy; the epidermal cells are differently shaped and somewhat less cutinised and the stomata are superficial. It also differs from *R. australis* in the appressed non-muriculate sheaths. It is of particular interest that *R. stenocoleus* shares the chromosome number $2n = 22$ with most other members of the species-group, whereas its apparent southern counterpart, *R. australis*, has $2n = 24$.

In parts of the New England district this species appears to be involved in introgressive hybridisation with *R. fimbriatus*. The hybrid material is discussed under the latter species. All the specimens cited above are typical *R. stenocoleus*.

The description given above applies to the majority of material of *R. stenocoleus*. However, the plants in two areas show some departure from the usual condition:

(1) The population along Bald Rock Creek, north-east of Wyberba, Queensland, shows considerable variation from plants of the normal form, through various intermediates, to the extreme form represented by S. T. Blake No. 4589, from 6 miles NE of Wyberba, swampy places at the foot of Bald Rock, 20.1.1933 (BRI 028890) which has the subtending bracts on the axis of the inflorescence shorter than the lowest spikelets, the apical free portion rounded or abruptly tapered, glabrous, scarcely longer than broad, shorter than the sheathing base, sometimes reflexed by contact with the lowest spikelet. The spikelets (male) are 1-16, on filiform pedicels, the exposed portion of which varies from 0-1 cm. long.

Observations made in the area suggest that there are not two distinct forms or ecotypes here, but rather a generally variable population, though the reasons for this variation are obscure. Extreme plants like Blake 4589 are in the minority. So far similar variation has not been found in other populations of *R. stenocoleus*. No anatomical difference from normal *R. stenocoleus* was observed in these plants, nor was any evidence found of fungal infection.

(2) The population on Barrington Tops, in the extreme south of the species' range, differs in the following respects: Subtending bracts on the main axis broader, up to 4 mm. in breadth, similar in shape to those of *R. australis*; female spikelets longer, up to 10 mm. long. In some individuals the stomata are slightly sunken.

Northern Tablelands: Barrington Tops, Beean Beean Plain, I. P. Burgess 12.6.1962 (NSW 61669); Barrington Tops, Polblue Creek, 5 miles S of Tubrabucca, B. G. Briggs 2.10.1961 (NSW 56161); Barrington Tops, Polblue Swamp, I. P. Burgess 12.6.1962 (NSW 61207; 61670); Barrington Tops, 1 mile NW of Carey's Peak, B. G. Briggs 1.10.1961 (NSW 56163); Barrington Tops, ¼ mile W of Carey's Peak, B. G. Briggs 1.10.1961 (NSW 56162); Barrington Tops, L. Harrison 1.1925 (NSW 47831); Barrington Tops, L. R. Fraser 20.8.1929 (NSW 47832); Barrington Tops, 4,800 ft., C. T. White No. 11616, 26.3.1938 (BRI 029565).

In general aspect these plants are somewhat reminiscent of *R. australis* but they differ in the appressed sheaths with non-muriculate surfaces and in the stomates being not at all or only slightly sunken. A chromosome number determination from this population (Briggs 1963) has given $2n = 22$ as in other material of *R. stenocoleus*. It is noteworthy that plants from the nearby Gloucester Tops (also with $2n = 22$) agree with normal *R. stenocoleus*. However, in both areas fungal infection is very common. Mr. J. Walker of the Biology Branch, N.S.W. Department of Agriculture, reports that the male spikelets are covered with a hyphal mat of an unidentified imperfect fungus, while the females are infected with a smut fungus, most probably a species of *Tolyposporium*. Also in these plants the awns of the glumes are very often twisted and deformed, due to an unknown cause.

3. R. longipes *L. Johnson et O. Evans*, sp. nov.

HOLOTYPE: Clyde Mtn., summit of the Pass, N.S.W., E. F. Constable 7.3.1961 (NSW 53506), female.

Rhizoma repens, breve, dense lanuginoso-tomentosum et squamis latis scariosis partim indutum, totum 5-10 mm. diametro. Culmi erecti, plerumque simplices, usque ad 150 cm. alti, 1-3 mm. diametro; vaginae 1·5-3 cm. longae, striatae, obtusae, erectae et arcte appressae. Bractea primaria infima arcte appressa, erecta, quam spicula infima brevior, tenuiter striata sed haud rugosa. Spiculae 6-25, in pedicellis filiformibus, in racemo laxo vel panicula angusta usque ad 25 cm. longa dispositae, ramis si exstantibus usque ad 3 cm. longis. Spiculae masculae ignotae, foemineae ellipsoideae, 6-8 mm. longae; glumae exteriores steriles glabrae vel parum fimbriatae pilis tenuibus brevibus; glumae floriferae ovatae vel ellipsoideae, aristulatae, 4-6 mm. longae, marginibus aliquando fimbriatis. Flores foeminei: tepala 4; staminodia 2; ovarium applanatum, biloculare, ramis styli 2 paene e basi liberis. Chromosomata somatica 22.

Rhizome creeping, short, densely woolly-hairy with a further partial covering of broad scarious scales, diam. over all 5-10 mm. Culms erect, usually unbranched, up to 150 cm. tall, 1-3 mm. diam.; sheaths 1·5-3 cm. long, striate, obtuse, erect and very closely appressed. Lowest subtending bract of the inflorescence closely appressed, erect, shorter than the lowest spikelet, finely striate but not rugose-muriculate. Spikelets 6-25, on filiform pedicels, arranged in a loose raceme or narrow panicle up to 25 cm. long. Male spikelets not known. Female spikelets ellipsoid, 6-8 mm. long; outer, barren glumes glabrous or slightly fringed with fine short hairs; flowering glumes ovate to elliptical, aristulate, 4-6 mm. long, margins sometimes fringed. Female flowers: tepals 4; staminodes 2; ovary 2-locular, flat; style branches 2, free almost from the base. Capsule not seen. Chromosome No. $2n = 22$ (Briggs 1963). Pl. III, 3.

DISTRIBUTION: Known only from Clyde Mountain, New South Wales in a swamp near the road, at the summit of the Pass on the Braidwood to Nelligen road, growing with *R. australis*. Fig. 1.

SPECIMENS EXAMINED: NEW SOUTH WALES: *Southern Tablelands:* Clyde Mtn., C. W. E. Moore 8.9.1952 (NSW 47841); Clyde Mtn., E. F. Constable 7.3.1961 (NSW 53506) HOLOTYPE; Clyde Mtn., M. E. Phillips 18.4.1961 (NSW 55207); Clyde Mtn., B. G. Briggs 24.12.1961 (NSW 60639, 60642).

Until recently *R. longipes* was known only from the single incomplete specimen NSW 47841, but it has since been found to be present in some quantity in a single swamp at the type locality. *R. australis* is also present in this swamp but no hybrids could be found. The chromosome numbers are different, and this would restrict interbreeding. *R. longipes* in this locality is much taller than *R. australis* and tends to grow in deeper water. It appears to be closely related to the northern species *R. stenocoleus* but differs considerably in the much longer and laxer inflorescence with most of the spikelets on long pedicels, as well as in the shape of the bracts as indicated in the key. Search for *R. longipes* in other localities in the eastern ranges of the Southern Tablelands is most desirable.

Despite search and extensive sampling of this single known population, no male individuals have been found. Capsules have not been seen in the female material available. It is therefore possible that this stand may represent a single clone.

Some instances of branching, unusual in this group, have been observed in barren culms.

4. R. gracilis *R.Br.*, Prodr. Fl. Nov. Holl. (1810) 245; Kunth, Enum. Pl. III (1841) 416; F. Muell., Fragm. Phytogr. Austral. VIII (1873) 69; Benth., Fl. Austral. VII (1878) 227; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 259; Moore & Betche, Handb. Fl. N.S.W. (1893) 443; Domin in Bibl. Bot. XX, Heft 85I (1915) 505; Maiden & Betche, Census N.S.W. Pl. (1916) 37.

LECTOTYPE: Port Jackson, N.S.W., R. Brown, BM (photo. seen), female. See Pl. V. Although R. Brown also cites Van Diemen's Land, there is no specimen from Tasmania extant in BM and the species is not known to occur there. The Port Jackson collection is accordingly here chosen as lectotype.

Rhizome creeping, short, dense and tufted, covered with closely appressed scarious scales, except near the apex of growth, where it is densely woolly-hairy beneath and between the scales; diameter over all 3-5 mm. with short crowded branches 0·5-2 cm. long. Culms erect, unbranched, 50-100 cm. tall, 1-1·75 mm. diam., closely arranged on the rhizome; sheaths appressed, obtuse, glabrous, 1-2 cm. long. Subtending bracts of the inflorescence erect, 1-2 cm. long. 2-3 mm. wide, tapering gradually to the apex, often exceeding the lowest spikelet. Spikelets 2-10 in number, occasionally more numerous, rarely solitary and terminal, usually arranged in a raceme or a narrow panicle. Male spikelets ellipsoid to globose, ca. 5-10 mm. long, usually on filiform pedicels. Female spikelets oblong-cylindrical, rarely ovate, 6-16 mm. long, 3-4 mm. diam., mostly shortly pedicellate or appearing nearly sessile. Flowering glumes in both sexes elliptical to narrow-lanceolate, aristate, mostly tapering gradually to the awn, 4-8 mm. long, glabrous or bearing a few fine marginal hairs. Male flowers: tepals 6; stamens 3. Female flowers: tepals 4; staminodes 2; ovary flat, 2-locular; style branches 2. Capsule opening along the margins. Chromosome No. $2n = 22$ (Briggs 1963). Pl. IV, 2.

DISTRIBUTION: New South Wales: Central and South Coast from the Gosford district to Jervis Bay, and extending in the south to the coastal ranges and eastern parts of the tablelands, in wet or damp sandy soils. Fig. 1.

SPECIMENS EXAMINED: NEW SOUTH WALES. *Central Coast:* 4 miles SW of Gosford, O. D. Evans 8.12.1961 (NSW 60206); near Woy Woy, H. Deane 11.1884 (NSW 52126); Curl Curl, H. Deane 12.1884 (NSW 52149); Bondi, H. Deane 12.1884 (NSW 52150); Port Jackson, F. Mueller 7.1855 (MEL); Centennial Park, W. Forsyth 10.1896 (NSW 47896, 48977; BRI 024652); Botany Bay, F. Mueller 12.1856 (MEL), 1857 (MEL); Botany Bay, O. D. Evans 2.1926 (SYD); La Perouse, J. H. Camfield 10.1898 (NSW 50358); Sutherland, J. H. Camfield 11.1893 (NSW 47897, 47898); Woronora R., J. J. Fletcher 10.1894 (NSW 52121); Waterfall, H. K. C. Mair & E. F. Constable 8.11.1950 (NSW 16462); National Park, O. D. Evans & D. Blaxell 13.4.1960 (NSW 52153); near Thirlmere, E. F. Constable 20.1.1961 (NSW 53266); N of Madden's Plains, O. D. Evans & D. Blaxell 16.5.1961 (NSW 54118); Madden's Plains, N of Sublime Point, G. Rodway 14.7.1935 (NSW 52155); Madden's Plains, O. D. Evans & D. Blaxell 13.4.1960 (NSW 52143); near Top of Bulli Pass, C. Davis & G. Rodway 28.5.1935 (NSW 52154); NW of Bulli Lookout, O. D. Evans & D. Blaxell 16.5.1961 (NSW 55185); near Loddon Falls, O. D. Evans 16.5.1961 (NSW 54119); Mt. Ousley, near Wollongong, E. J. McBarron No. 4073, 20.11.1949 (BRI); Cordeaux Dam reserve, H. K. C. Mair & E. F. Constable 8.11.1950 (NSW 16464); Cordeaux Dam reserve, O. D. Evans & D. Blaxell 6.12.1960 (NSW 52763, 52764); Cambewarra Range, F. A. Rodway 10.5.1941 (NSW 49885). *Central Tablelands:* Hill Top, J. H. Maiden 1.1896 (NSW 49700); Hill Top, E. Cheel 11.1911 (NSW 47899); Mittagong to Wombeyan Caves road, E. F. Constable 19.1.1961 (NSW 53273). *South Coast:* Nowra to Sassafras road, F. A. Rodway 12.1923 (NSW 49794); Jervis Bay, F. A. Rodway 1.1928 (NSW 49784); Cape St. George, S of Jervis Bay, F. A. Rodway 21.12.1941 (NSW 49783); Pigeon House Range, E. F. Constable 10.1961 (NSW 56885, 56886, 56887); Tianjara Falls, Pigeon House Range, B. G. Briggs 23.12.1961 (NSW 56867, 60697, 60698); 1 mile SW of Tianjara Falls, Pigeon House Range, B. G. Briggs 23.12.1961 (NSW 56868).

With the recognition of the other species treated in this revision the supposed difficulty of distinction between *R. gracilis* and *R. australis* is resolved. The presence or absence of staminodes given as a distinguishing character is not valid, staminodes being present throughout the group. *R. gracilis* differs from all the other species in the shape of the female spikelets, which differ strikingly from the males, and of the flowering glumes, and also to some extent in the anatomy of the culms (see p. 216 and figs. 3c, 5b). Records of the species from Queensland refer in fact to *R. pallens*, *R. stenocoleus* and possibly *R. tenuiculmis*. Records from Victoria are based on material of *R. australis* and there is no authentic record of *R. gracilis* from Tasmania. A collection supposedly from Recherche Bay, Tasmania, belongs to the apparent hybrid series derived from *R. fimbriatus* and *R. stenocoleus* (see p. 212) and was probably actually collected in New England, New South Wales.

Several specimens from Tianjara Falls, Pigeon House Range area, are remarkable for their stout culms and broad subtending bracts. However, slender forms also occur in this area.

The species grows in places with *R. fimbriatus* and overlaps in general distribution with *R. pallens* but no intermediates are known.

5. R. fimbriatus *L. Johnson et O. Evans*, sp. nov.

TYPIFICATION: The Lake, Wentworth Falls, N.S.W., E. F. Constable 26.1.1961 (NSW 53214), female, HOLOTYPE. The Lake, Wentworth Falls, E. F. Constable 26.1.1961 (NSW 53215) male, PARATYPE.

Rhizoma repens, breve, squamis glabris scariosis castaneis arcte appressis indutum, aliquando tomentum nonnullum lanuginosum exhibens, externe 2-5 mm. diametro. Culmi erecti, macri sed tenaces, simplices, 20-80 cm. alti, 0·75-1·5 mm. diametro; vaginae arcte appressae, 1-2 cm. longae, obtusae, unaquaeque praeter inferiores saepissime cristula apicali pilorum tenuium alborum 1-4 mm. longorum insignis. Bracteae primariae quam spiculae valde breviores, omnes praeter supremae arcte appressae, vaginis caulinis similes. Spiculae saepissime 1-6 (nonnunquam plures) vel solitariae terminalesque vel in racemo paniculave angusta dispositae, vel in speciem sessiles vel in pedicellis filiformibus. Glumae floriferae 3-4 (-5) mm. longae, ovatae vel ellipticae, apice mucronatae vel aristatae, marginibus pilis longis vel brevibus fimbriatae. Flores masculi: tepala 6; stamina 3. Flores foeminei: tepala 4; staminodia 2; ovarium applanatum, biloculare, ramis styli 2 paene e basi liberis. Capsula applanata, bilocularis, marginaliter dehiscens; semen ellipsoideum, castaneum, laeve, circiter 0·8 mm. longum. Chromosomata somatica 22.

Rhizome creeping, short, covered with closely appressed, glabrous, scarious, brown scales, occasionally with some woolly hairs showing from beneath; diameter 2-5 mm. over all. Stems erect, thin and wiry, unbranched, 20-80 cm. tall, 0·75-1·5 mm. diam.; sheaths closely appressed, obtuse, 1-2 cm. long, each usually bearing an apical tuft of fine whitish hairs 1-4 mm. long, those near the base excepted. Subtending bracts of the inflorescence shorter than the spikelets, all except the uppermost closely appressed in a similar manner to the sheaths on the culm. Male and female inflorescences and spikelets very similar. Spikelets varying from ovate, with acute or obtuse apices, to globose, 4-7 mm. long, mostly 1-6 in number, occasionally more, either solitary and terminal or arranged in a raceme or a narrow panicle; individual spikelets borne on filiform pedicels except where terminal on the main axis. Barren glumes fringed with fine, long hairs; flowering glumes 3-4 (rarely 5) mm. long, ovate to elliptical, with a mucronate or an aristulate apex; margins often fringed with short or long hairs. Male flowers: tepals 6; stamens 3. Female flowers: tepals 4; staminodes 2; ovary flat, 2-locular; style branches 2, free almost from the base. Capsule 2-locular, opening along the margins; seed ellipsoid, brown, smooth, ca. 0·8 mm. long. Chromosome No. $2n = 22$ (Briggs 1963). Pl. IV, 1.

DISTRIBUTION: New South Wales: Northern, Central and Southern Tablelands, extending also to the north-western part of the Central Coast on the Mellong Range and to the South Coast near Jervis Bay. Probably also in the Wallangarra area of Queensland. (See p. 212). In damp, sandy or gravelly soil often on the margins of swamps. Fig. 2.

SPECIMENS EXAMINED: NEW SOUTH WALES: *Northern Tablelands:* Torrington to Bismuth road, E. F. Constable 26.3.1962 (NSW 57024, 57025); Gibraltar Range, 43 mile peg on Glen Innes to Grafton road, E. F. Constable 26.3.1962 (NSW 57084); Gibraltar Range, ca. 41 miles from Glen Innes, E. F. Constable 5.5.1961 (NSW 55189, 55881); Gibraltar Range, J. W. Green 25.11.1960 (NSW 60895). *Central Coast:* Mellong Swamp, 48 miles from Windsor on Singleton road, O. D. Evans & D. Blaxell 6.12.1960 (NSW 53082, 53083); Mellong Range, 41 mile peg from Windsor, L. A. S. Johnson 5.5.1962 (NSW 57011, 57012); Mellong Range, 1 mile N of Grassy Hill, L. A. S. Johnson 9.4.1953 (NSW 47895). *Central Tablelands:* Mt. Victoria, E. Cheel 12.1900 (NSW 47876); Shipley, Blackheath, E. F. Constable 21.2.1962 (NSW 57027, 57028); Katoomba, A. A. Hamilton 12.1902 (NSW 47877); Katoomba, J. H. Camfield 12.1908 (NSW 47878, 47879); Katoomba, L. A. S. Johnson & B. G. Briggs 7.5.1962 (NSW 57013); Minna Ha Ha Falls, Katoomba, E. F. Constable 26.1.1961 (NSW 53268), 19.3.1962 (NSW 57078); The Lake, Wentworth Falls, E. F. Constable 26.1.1961 (NSW 53214, HOLOTYPE; 53215), 19.3.1962 (NSW 57079); King's Tableland, Wentworth Falls, W. Forsyth 11.1898 (NSW 47880, 47881); King's Tableland, Wentworth Falls, E. F. Constable 26.1.1961 (NSW 53271, 53272); Wentworth Falls, J. H. Maiden 10.1908 (NSW 47882); Lawson, J. H. Camfield 4.1897 (NSW 47883); Edina Falls, near Hill Top, O. D. Evans & E. F. Constable (NSW 49786, 49787, 53277, 53278); 9½ miles NW of Mittagong on Wombeyan Caves Road, E. F. Constable 19.1.1961 (NSW 53217); Mt. Jellore, E. Cheel 1.1902 (NSW 47885); Mittagong, W. Greenwood 11.1913 (NSW 47884); Moss Vale to Fitzroy Falls, F. A. Rodway No. 9441, 30.11.1930 (NSW 49792); Fitzroy Falls, E. F. Constable 24.2.1960 (NSW 49789, 49790); 1 mile E of Fitzroy Falls, L. A. S. Johnson 15.4.1951 (NSW 47886); Bundanoon Creek, E. F. Constable 2.1960 (NSW 49788); Wingello, J. L. Boorman 11.1899 (NSW 47887); Wingello, J. L. Boorman 12.1913 (NSW 47888); Wingello State Forest, E. F. Constable 22.1.1956 (NSW 36568); Paddy's R., L. Calvert (MEL); Barber's Creek, Tallong, H. J. Rumsey 3.1899 (NSW 47889); Barber's Creek, J. H. Maiden 1.1898 (NSW 53080); Marulan-Tallong, C. W. E. Moore 16.9.1953 (NSW 47892). *South Coast:* Point Perpendicular, E. F. Constable 6.10.1960 (NSW 53081). *Southern Tablelands:* Charleyong-Tarago road, C. W. E. Moore 15.10.1952 (NSW 47893); 2 miles SW of Nerriga on Braidwood road, E. F. Constable 9.3.1961 (NSW 54114, 54115).

This species has been included by Mueller and others under *R. gracilis*. However, it differs strikingly from that species in general appearance, in the shape of the spikelets and of the flowering glumes, the numerous long hairs on the glumes (especially the barren ones), and the tufts of hairs on the sheaths of the stem. The distributions of *R. fimbriatus* and *R. gracilis* overlap on the south-eastern portion of the Central Tablelands, but the species remain distinct even when growing together. On the Central Tablelands the range of *R. fimbriatus* overlaps that of *R. australis* but these two species also remain quite distinct. In the latter case the chromosome numbers are different. The specimen from Paddy's River, L. Calvert, appears to be a giant form with pedicels up to 4·5 cm. long and female spikelets to 9 mm. long, but it does not differ in the characteristic features of *R. fimbriatus*. In the Mellong Range area, stouter, taller plants with thicker rhizomes are found together with slender and intermediate individuals, but all share the same characteristic features. One specimen from Mellong Range, O. D. Evans 1.12.1960 (NSW 53083), has the inflorescence enlarged to form a loose but narrow panicle 20 cm. long, bearing from 10 to 50 spikelets. The style branches were found to be deformed, indicating that the plant was probably affected by a pathogen, which may also account for the unusual inflorescence.

R. fimbriatus has a disjunct distribution, its northern occurrence in the Torrington and Gibraltar Range districts being widely separated from the main southern area of the species. The specimens from the northern localities are quite typical of the species in general morphology, including inflorescence, hairs, slender stems and rhizomes as well as epidermal anatomy. However, other material from northern localities suggests hybrid origin as discussed below.

R. fimbriatus × *R. stenocoleus.* The following specimens appear to be derived from hybridisation of these two species:

Queensland: *Darling Downs District:* near Mt. Norman, 6 miles N of Wallangarra, E. F. Constable 30.3.1962 (NSW 57075, 57076). New South Wales: *Northern Tablelands:* Tenterfield to Boonoo Boonoo, E. F. Constable 10.5.1961 (NSW 55191, 55192), 31.3.1962 (NSW 57072); Torrington to Bismuth road, E. F. Constable 13.5.1961 (NSW 55187); Torrington, J. L. Boorman 1.1911 (NSW 52871); New England, C. Stuart (MEL).

This material, though variable, is in general intermediate between *R. fimbriatus* and *R. stenocoleus;* this is particularly evident in the following features: thickness of rhizome and culms, presence of a small tuft of hairs on some of the sheaths, length of hairs on the glumes, closeness of the spikelets in the inflorescence, length and shape of the subtending bract, and the shape, regularity of arrangement, thickness and straightness of the walls of the epidermal cells as seen in surface section. The epidermis of the two species is shown in Fig. 3e, f. It is noteworthy that, in the collections, such apparently hybrid material outnumbers *R. fimbriatus* in the north, though collections of typical *R. stenocoleus* are numerous. The situation, which is the only known case of hybridism in eastern Australian *Restio*, needs further field study, but it suggests that the northern populations of *R. fimbriatus* may be becoming replaced by plants of hybrid nature through the process of introgression.

A specimen in MEL, labelled " *R. gracilis*, Recherche Bay, C. Stuart ", also belongs in this hybrid series. This is probably a duplicate of the collection cited by Bentham (1878) as the only Tasmanian specimen of *R. gracilis.* It cannot be from Tasmania and is probably one of Stuart's New England collections which has been mislabelled.

6. R. pallens *R.Br.*, Prodr. Fl. Nov. Holl. (1810) 245; Kunth, Enum. Pl. III (1841) 415.

Holotype: Port Jackson, N.S.W., R. Brown, BM 5867 (photo. seen), male. See Pl. VI. (" Port Jackson " is to be interpreted in a broad sense in this usage. The specimen was probably collected some distance to the north or north-west.)

Rhizome creeping, short, woolly-hairy, partly covered with pale scarious scales; diameter over all ca. 6-10 mm. Stems erect, unbranched, 50-100 cm. tall, 2-4 mm. diam.; sheaths all appressed, glabrous, obtuse, 1-3 cm. long. Subtending bracts of the inflorescence shorter or only slightly longer than the lowest spikelets, less than 15 mm. long; the apical free portion rounded or abruptly tapered, glabrous, scarcely longer than broad, sometimes reflexed by contact with the lowest spikelet. Spikelets 10-60, very shortly pedicellate or nearly sessile, arranged in a narrow panicle up to 25 cm. long which is usually twice branched; individual spikelets ellipsoid to subglobose, rarely somewhat acute at the apex, 4-6 mm. long, 3-5 mm. diam.; the sexes nearly similar in size and shape prior to anthesis. Flowering glumes ovate to elliptical, mucronate, glabrous or rarely with a few marginal hairs, 2-3·5 mm. long. Male flowers: tepals 6; stamens 3. Female flowers: tepals 4; staminodes 2; ovary flat, 2-locular; style branches 2. Capsule opening along the margins. Chromosome No. $2n = 22$ (Briggs 1963). Pl. III, 1.

Distribution: Queensland and New South Wales: Southern coastal region of Queensland in the Wide Bay and Moreton Districts; North and Central Coast of New South Wales as far south as Agnes Banks in the Hawkesbury River district near Richmond; in deep wet sandy soils, chiefly in " wallum " areas. Fig. 1.

SPECIMENS EXAMINED: QUEENSLAND: *Wide Bay District:* Fraser Is., C. T. White 10.1921 (BRI 024628), No. 2532, 5.1925 (BRI 024647); Fraser Is., Lovell (BRI 024640); Fraser Is., J. E. Coaldrake (BRI 024640); Fraser Is., J. E. Coaldrake (BRI 024745); Coondoo Ck., W. D. Francis 12.1919 (BRI 024632); Lake Cootharaba, W. D. Francis 12.1919 (BRI 024633); Lake Cootharaba, Keys & Wedd (BRI 024637); wallum country, J. Keys 1.1904 (BRI 024649); *Moreton District:* Coolum, J. E. Coaldrake 8.12.1950 (BRI 024746); Mooloolah Heads, Field Naturalists' Excursion, 4-5.1911 (BRI 024638); Landsborough-Caloundra, A. H. S. Lucas 1.1909 (NSW 47901); Beerwah, S. T. Blake No. 21161, 18.11.1959 (BRI 019682); Bribie Is., C. T. White 4.1915 (BRI 024630, 024631, 024634, 024646); Bribie Is., W. D. Francis 11.1919 (BRI 024635); Bribie Is., south end, C. E. Hubbard No. 2586, 7.5.1930 (BRI 024643); Bribie Is., S. T. Blake No. 4834, 5.6.1933 (BRI 028892, 028893); Moreton Is., C. T. White 3-4.1924 (BRI 024648); between Cooper's Plains and Sunnybank, C. E. Hubbard No. 3058, 22.6.1930 (BRI 024644); Sunnybank, S. T. Blake (No. 1311) and C. G. Greenham 30.5.1932 (BRI 024744); Brisbane R. (MEL); Geebung, Brisbane, S. T. Blake No. 1443, 29.12.1932 (BRI 028891); Dunwich (Stradbroke Is.), 3.1892 (BRI 024639); Stradbroke Is., C. T. White 3.1915 (BRI 024645); Stradbroke Is., C. E. Hubbard No. 2249, 19.4.1930 (BRI 024627); Southport, N. Michael No. 2252, 21.1.1936 (BRI 024641); Currumbin Ck., C. T. White 14.12.1907 (BRI 024650). NEW SOUTH WALES: *North Coast:* Tweed R., Guilfoyle (MEL); Cudgen Lake, Tweed R. district, E. F. Constable 29.5.1962 (NSW 61210); Richmond R., Hodgkinson (MEL); Broadwater, N of Woodburn, L. A. S. Johnson 24.4.1962 (NSW 57081); Hat Head (E of Kempsey), E. F. Constable 18.1.1953 (NSW 22082); Hat Head, C. K. Ingram 12.1.1961 (NSW 53507, 53508); Bombah Point, Myall Lakes, E. F. Constable 19.1.1952 (NSW 19362); Shoal Bay, Port Stephens, C. Davis 2.9.1941 (NSW 49795). *Central Coast.* Doyalson, Wyong to Swansea, O. D. Evans & E. F. Constable 28.1.1960 (NSW 49089, 49090); Richmond, R. W. Farlow 1.1907 (NSW 47833); Agnes Banks near Richmond, Hawkesbury River district, E. F. Constable 6.1.1961 (NSW 52868, 52869), 17.1.1962 (NSW 60801, 60802); Port Jackson, R. Brown 1801-5 (BM; photographs NSW); Port Jackson, F. Mueller 7.1855 (MEL).

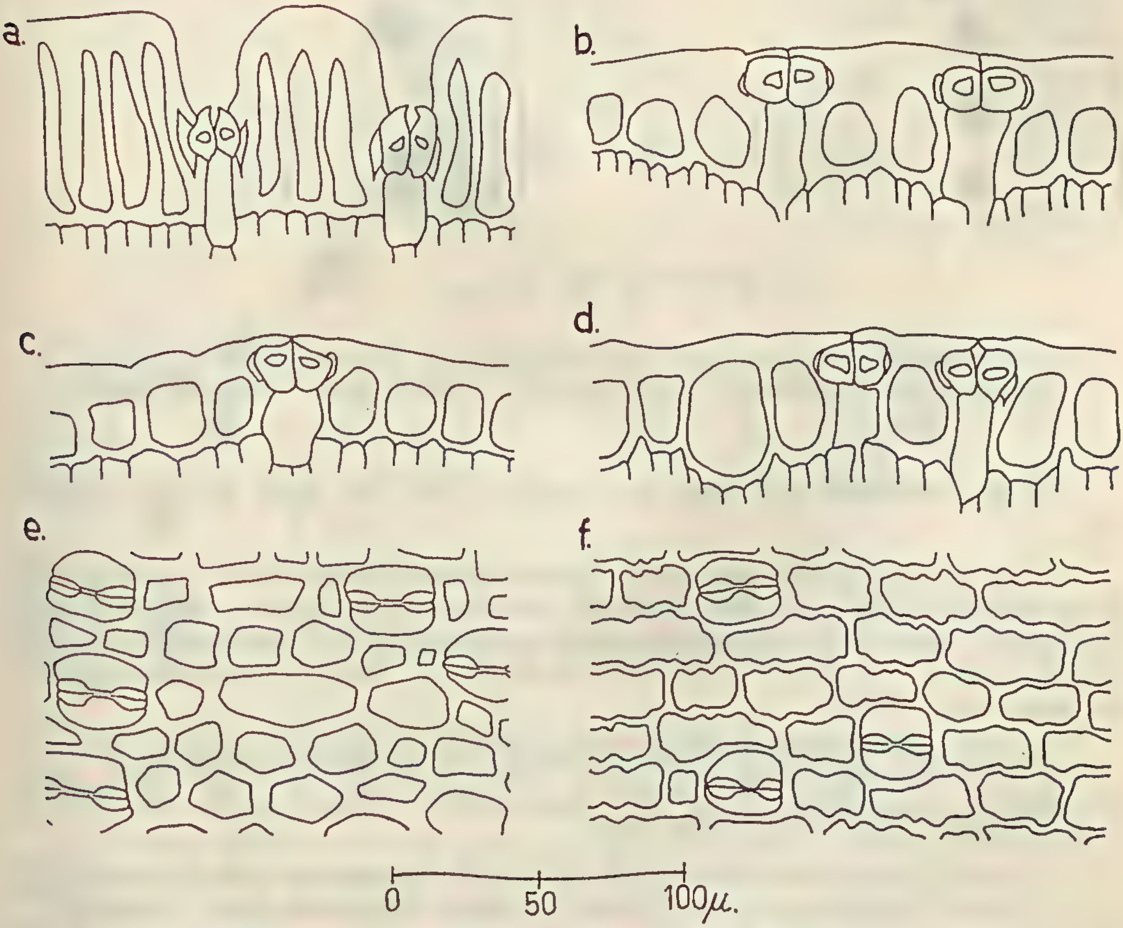


Fig. 3.—a-d. Transverse sections of culm epidermis of *Restio* species: a. *R. australis.* b. *R. stenocoleus.* c. *R. gracilis.* d. *R. pallens.* e-f. Surface sections of epidermis: e. *R. stenocoleus.* f. *R. fimbriatus.*

Although described by Robert Brown, *R. pallens* has been referred by later authors to the synonymy of *R. gracilis*. It differs strikingly from that species in the shape and number of the spikelets, the shape and size of the glumes, the shape of the subtending bract, the thickness of the culms and the rhizome, and in the anatomy of the stem (see p. 216 and figs. 3, 4, 5). *R. pallens* is strictly a lowland species. In the south its range slightly overlaps that of *R. gracilis*, and in the north it occupies a considerable area in common with *R. tenuiculmis*. There is no known hybridism with either of these species; *R. gracilis* has not been found on the same sites as *R. pallens*, and although *R. pallens* and *R. tenuiculmis* can be found growing side by side, these two species have different chromosome numbers.

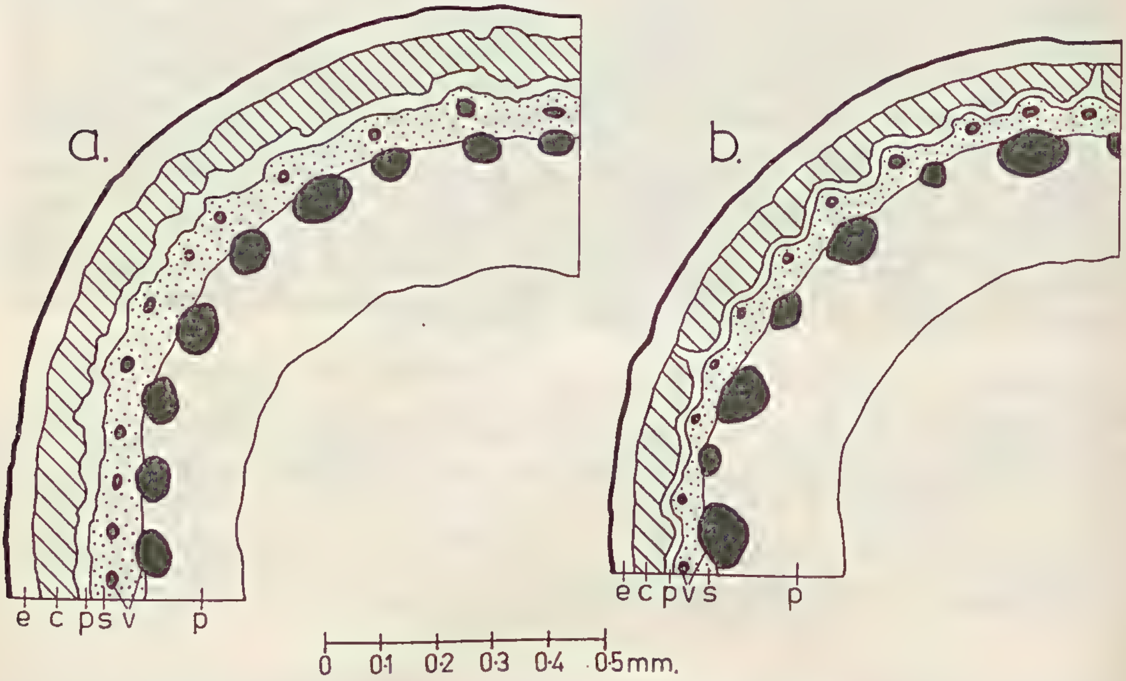


Fig. 4.—Transverse sections of culms of *Restio* species: a. *R. stenocoleus*. b. *R. pallens*. *c*. chlorenchyma. *e*. epidermis. *p*. parenchyma. *s*. sclerenchma. *v*. vascular bundles.

7. R. tenuiculmis *S. T. Blake* in Contrib. N.S.W. Nat. Herb. III, No. 4 (1963) 198.

This species, from south-eastern Queensland and the far North Coast of New South Wales, is described and discussed elsewhere in this issue. We have seen the material cited by Dr. Blake and are in agreement that *R. tenuiculmis* is a very distinct species. Its distribution is shown in fig. 2. Further specimens not seen by Blake are as follows:

Queensland: *Moreton District:* ½ mile N of Beerwah, near pine plantation, L. A. S. Johnson 27.5.1961 (NSW 55369, 55370, 55371, 55372). New South Wales: *North Coast:* Broadwater, N of Woodburn, L. A. S. Johnson 24.4.1962 (NSW 57082); Wardell, E. F. Constable 24.10.1961 (NSW 56427, 56428, 56549, 56550).

The specimens from Beerwah, though quite characteristic of *R. tenuiculmis*, show a feature rarely seen in the remainder and not included in Blake's description, namely branching of the culms. Areas of moist coastal heath on the North Coast of New South Wales need further search for *R. tenuiculmis*, which may extend farther south than its present known limit.

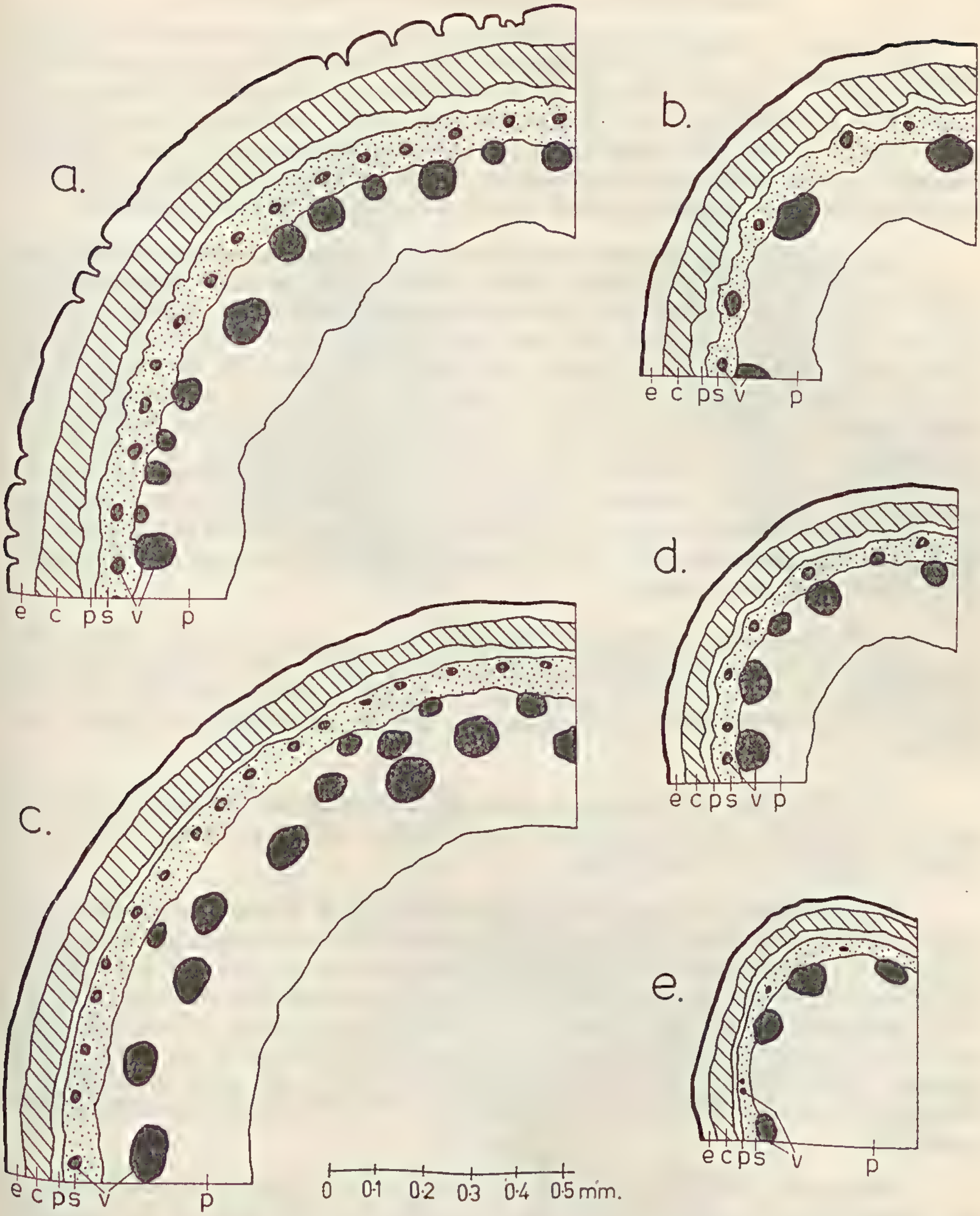


Fig. 5.—Transverse sections of culms of *Restio* species: a. *R. australis.* b. *R. gracilis.* c. *R. longipes.* d. *R. fimbriatus.* e. *R. tenuiculmis.* *c*, *e*, *p*, *s* and *v* as in Fig. 4.

R. tenuiculmis ($2n = 14$, Briggs 1963) differs strikingly in cytological features from the other species treated here, and consequently a close relationship with them is doubtful. Nevertheless, detailed examination has failed to reveal any morphological or anatomical characters to distinguish it clearly from the *gracilis* complex. It differs considerably from other *Restio* species with $2n = 14$, namely *R. dimorphus* R.Br. and *R. fastigiatus* R.Br.

ANATOMICAL FEATURES OF THE CULM

A study of certain features of the stem anatomy was carried out with the aim of obtaining information of taxonomic value. Several useful diagnostic features were found but, except in the case of *R. australis* and *R. stenocoleus*, these are not confined to individual species. Transverse and surface sections were cut from the upper region of the culm some distance below the inflorescence, using herbarium material, or fresh specimens when available. Dried material is readily reconstituted by boiling for a few minutes in water with a few drops of household detergent.

Epidermis: In *R. australis* the epidermis is readily distinguishable from that of all the other species by the deeply sunken stomates and the shape of the epidermal cells. In transverse section of the culm the epidermis consists of radially elongated narrow cells, thickly cutinised on three walls (fig. 3a). In surface section these cells appear irregular in shape with the walls much thickened, but the basal portion is seen in optical section to be thin and corrugated. In thin sections the depressions which contain the stomates may be very clearly seen. In surface section, both *R. stenocoleus* and *R. longipes* have rather irregularly shaped epidermal cells, predominantly about as broad as long, with thick walls and arranged in unevenly parallel rows (fig. 3e). In transverse section the cuticle is thick on the outer wall and sometimes extends down the inner walls. The stomates are either flush with the surface (*R. stenocoleus*, fig. 3b) or slightly sunken (*R. longipes* and Barrington Tops form of *R. stenocoleus*).

In *R. fimbriatus* and *R. gracilis*, in surface section, the cells are more or less rectangular in shape, predominantly longer than broad, with comparatively thin but corrugated walls, and are arranged in regular parallel rows (fig. 3f). The condition in probable hybrids of *R. fimbriatus* and *R. stenocoleus* is discussed above (p. 212).

R. pallens also has epidermal cells with comparatively thin walls, but these are not corrugated and the cells are predominantly about as broad as long and slightly irregular in size and shape.

Other features: As seen in transverse sections (fig. 4, 5), the culms of the various species exhibit some other differences. Immediately below the epidermis is a cylinder of palisade chlorenchyma consisting of one to three tiers of cells. It is continuous in each species except in *R. pallens* where it may be intersected by occasional " rays " of parenchyma. The inner surface of the chlorenchyma is more or less undulating, the undulations corresponding approximately with the positions of the small vascular bundles which form the outer ring. These undulations are most pronounced in *R. pallens* but are irregular to absent in *R. gracilis;* the other species show intermediate conditions.

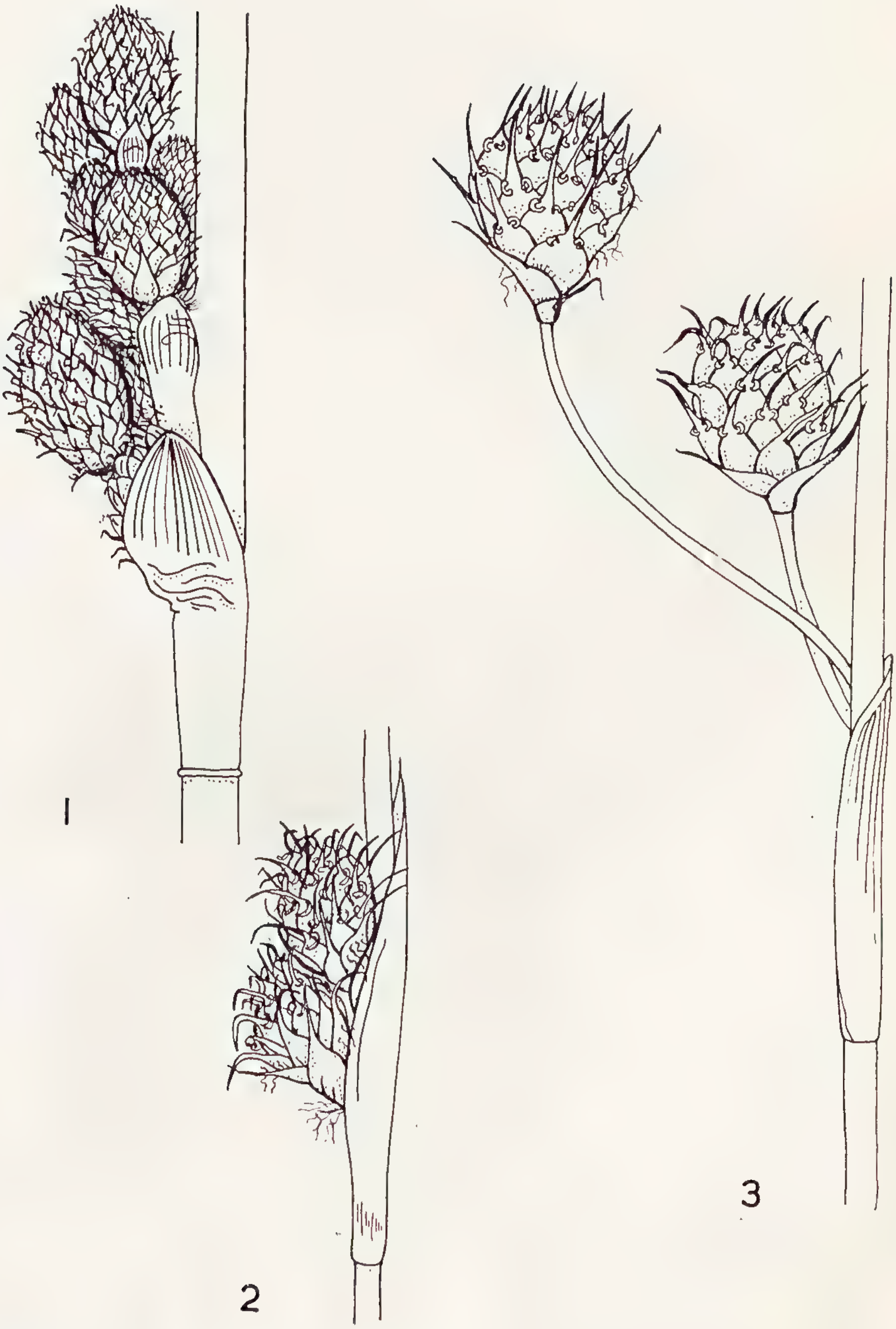
Within the cylinder of chlorenchyma is a thin layer of parenchyma. In *R. australis* and *R. stenocoleus* this layer is mostly two cells thick; in *R. fimbriatus*, *R. pallens* and *R. longipes* it is usually one cell thick, whilst in *R. gracilis* it is one cell thick, but the cells are much reduced in size and in some places are absent.

Within this parenchymatous sheath there is a continuous cylinder of sclerenchyma four to ten cells in thickness and on the inner boundary of this, partly or wholly embedded in the parenchyma of the pith, are the larger vascular bundles of the inner group.

The culm anatomy of a South African species, *R. triticeus* Rottb., has been described in some detail by Noel (1959). There is a broad correspondence of

Plate III

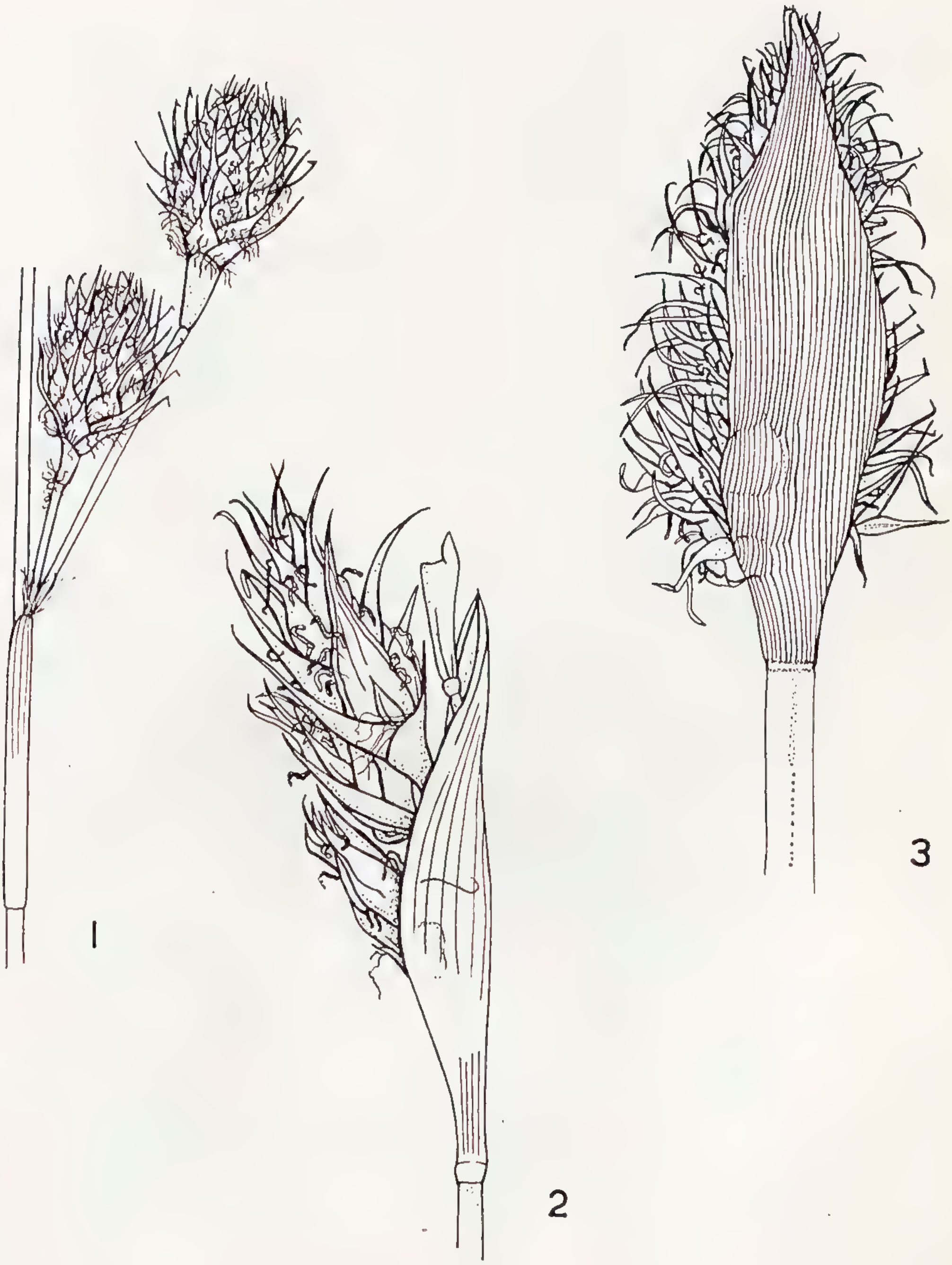
M. D. Tindale del.



Primary bract and partial inflorescence × 3⅓. 1. *Restio pallens*. 2. *R. stenocoleus*. 3. *R. longipes*.

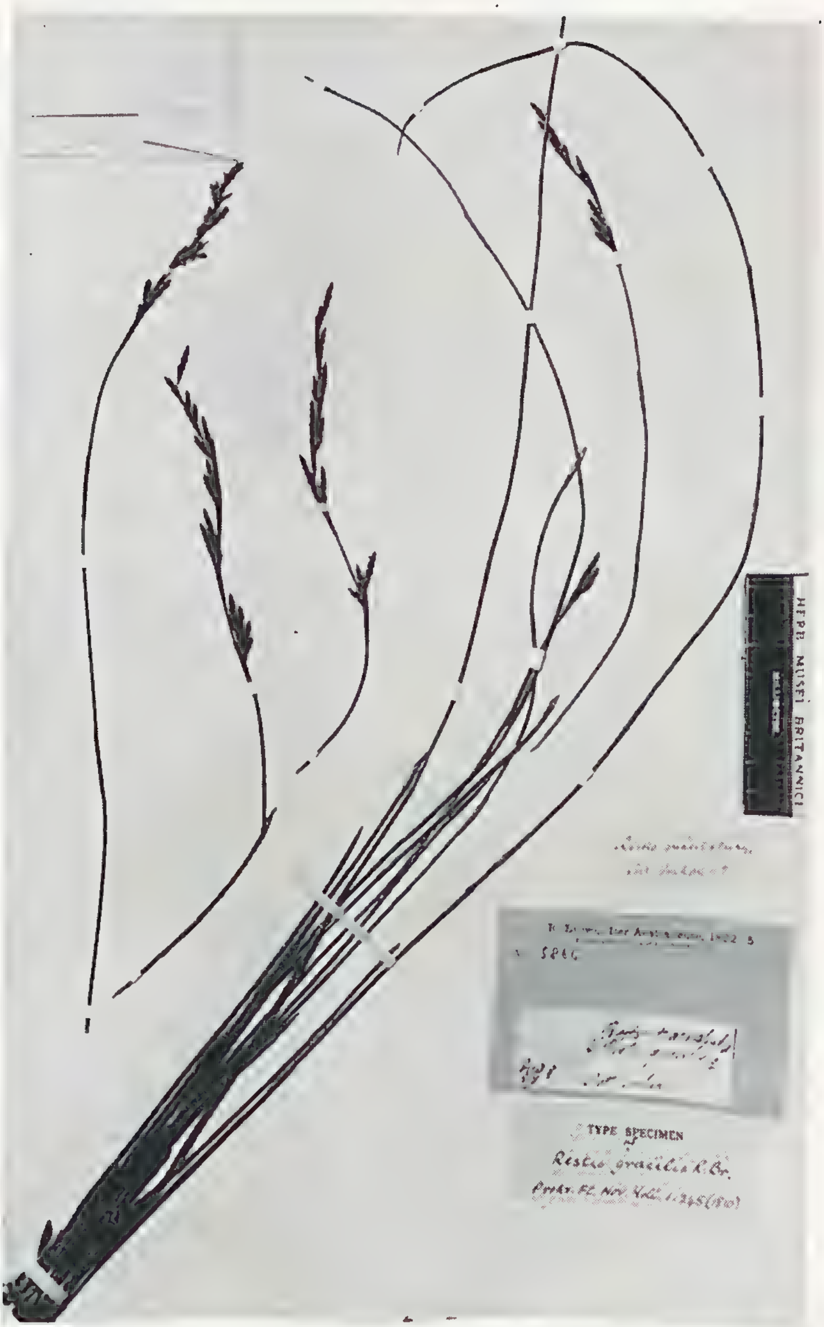
Plate IV

M. D. Tindale del.

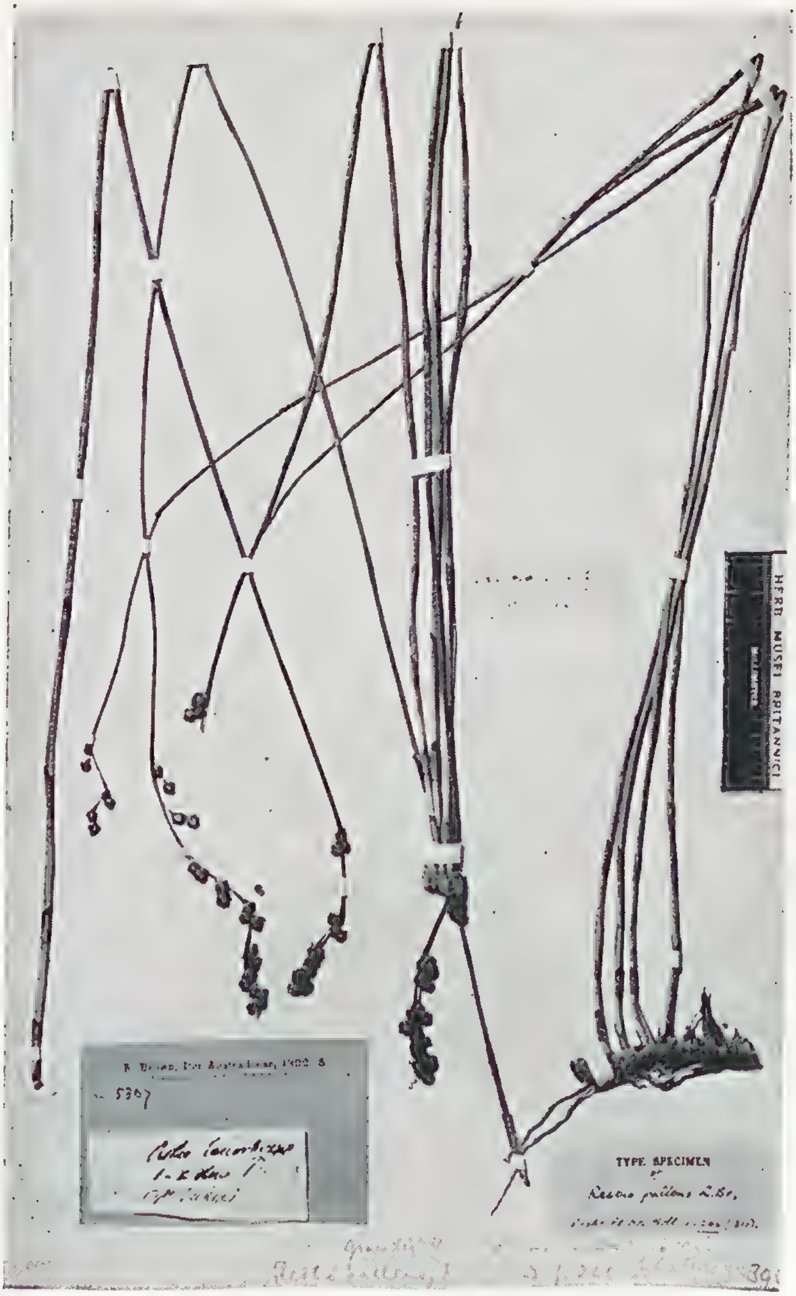


Primary bract and partial inflorescence × $3\frac{1}{3}$. 1. *Restio fimbriatus*. 2. *R. gracilis* 3. *R. australis*.

Plate V



Holotype sheet of *Restio gracilis* R.Br. Photo, British Museum Natural History).



HOLOTYPE sheet of *Restio pallens* R.Br. Photo., British Museum (Natural History).

tissues between this and the *R. gracilis* group but considerable differences in detail. In other Australian species there is a wide variety of anatomical conditions (Johnson, unpublished).

ACKNOWLEDGMENTS

Our thanks are due to the Directors of the Melbourne and Brisbane Herbaria, and also to Dr. R. Carolin, Curator of the Herbarium of the Botany Department, University of Sydney, and Miss J. Somerville of the Botany Department, University of Tasmania, for the loan of specimens. Dr. S. T. Blake, of the Queensland Herbarium, very kindly agreed to publish his paper on *Restio tenuiculmis* in this issue so that our treatment could be complete. Mr. J. B. Williams of the University of New England, Dr. M. E. Phillips of the Parks and Gardens Section, Department of the Interior, Canberra, and Mr. I. P. Burgess, Forestry Office, Taree kindly collected and made field observations on two of the new species. We should like to thank Dr. J. E. Dandy, Keeper of Botany, British Museum (Natural History), for permission to publish photographs of Robert Brown types from that institution.

Finally we wish to thank our colleagues at the National Herbarium of New South Wales, especially Miss Mary Tindale for her fine drawings of the various species, Dr. Barbara Briggs for the final drawings of anatomical features, for collection of some critical forms and for the frequent testing necessary in devising usable keys, Miss Neridah Ford for further testing of the keys, and Mr. E. F. Constable for making numerous collections of most of the species.

LITERATURE CITED

Bentham, G., 1878.—Flora Australiensis VII, i-xii, 1-806. London.

Briggs, B. G., 1963.—Chromosome numbers in *Lepyrodia* and *Restio* in Australia. Contrib. N.S.W. Nat. Herb. III, 228-232.

Brown, R., 1810.—Prodromus Florae Novae Hollandiae et Insulae Van-Diemen. i-viii, 1-592, London.

Lanjouw, J. and Stafleu, F. A., 1959—Index Herbariorum, Pt. I, ed. 4. Regnum Vegetabile XV, 1-249.

Masters, M. T., 1878.—Restiaceae. *In* A. and C. De Candolle, Monographiae Phanerogamarum I, 218-398. Paris.

Noel, A. R. A., 1959.—The stem anatomy of *Restio triticeus* Rottb., *Bobartia indica* L., and *Cadaba juncea* (Sparm.) Harv. Journ. S. Afr. Bot. XXV, 357-370.

Geographic Races in *Restio tetraphyllus* Labill.

L. A. S. JOHNSON AND O. D. EVANS

SUMMARY

Two geographic subspecies are distinguished in *Restio tetraphyllus* Labill. Ssp. *tetraphyllus* occurs in the extreme south-east of New South Wales, southern Victoria, the south-east of South Australia, and Tasmania. Ssp. *meiostachyus* ssp. nov. is found in the coast districts of Queensland and New South Wales as far south as Milton. There is a disjunction between the known ranges of the subspecies and no intergrading forms have been collected.

An investigation of *Restio tetraphyllus* Labill. has shown that this species comprises two geographic races which are readily distinguishable in fertile material of either sex and which show a correlated tendency, though no absolute difference, in the length of the assimilatory branchlets.

At present the northern race is known to occur in North Queensland (a single known locality on Cape York Peninsula) and in coastal areas from Fraser Island in Southern Queensland to the Milton district in New South Wales, with an outlying occurrence in the Timbarra area on the north-eastern edge of the New England Tablelands. It is usually found on deep moist sandy soils, for instance in " wallum " communities and Paperbark (*Melaleuca*) swamp forests. Within this range there do not appear to be any discernible clinal trends.

The southern (type) race is known in similar soils from the extreme south coast of New South Wales, through eastern and southern Victoria to the south-east of South Australia and in the Bass Strait Islands and Tasmania, chiefly near the coast but occasionally occurring as far inland as the Grampians and Horsham in western Victoria. Again there is little indication of clinal gradation within most of this range. It is possible, however, that intergrading forms will be found in the intervening area between the two races, from which the species has not yet been collected although there seems to be no reason why it should not occur. The Disaster Bay specimens are poor, but may indicate some approach to the northern race.

The differences between the races are set out below. In view of the general similarity and the likelihood of intergrading populations being found in the connecting area the two groups can hardly be regarded as species, but are an excellent example of geographic subspecies.

Restio tetraphyllus *Labill.*, Pl. Nov. Holl. II (1806) 77, t. 226, 227; R.Br., Prodr. Fl. Nov. Holl. (1810) 247; Kunth, Enum. Pl. III (1841) 420; Hook. f., Fl. Tasm. II (1857) 71; F. Muell., Fragm. Phytogr. Austral. VIII (1873) 66; Masters in A. & C. DC., Monogr. Phanerog. I (1878) 270; Benth., Fl. Austr. VII (1878) 228; Moore & Betche, Handb. Fl. N.S.W. (1893) 442; F. M. Bail., Queensl. Fl. VI (1902) 1723; Domin in Bibl. Bot. XX, Heft 85^{I} (1915) 504; Maid. & Betche, Census N.S.W. Pl. (1916) 37; Ewart, Fl. Vict. (1931) 256; Black, Fl. S. Austr., ed. 2, I (1943) 173.

A complete description will be published in the Flora of New South Wales, No. 25. The distribution of the subspecies is shown in fig. 1.

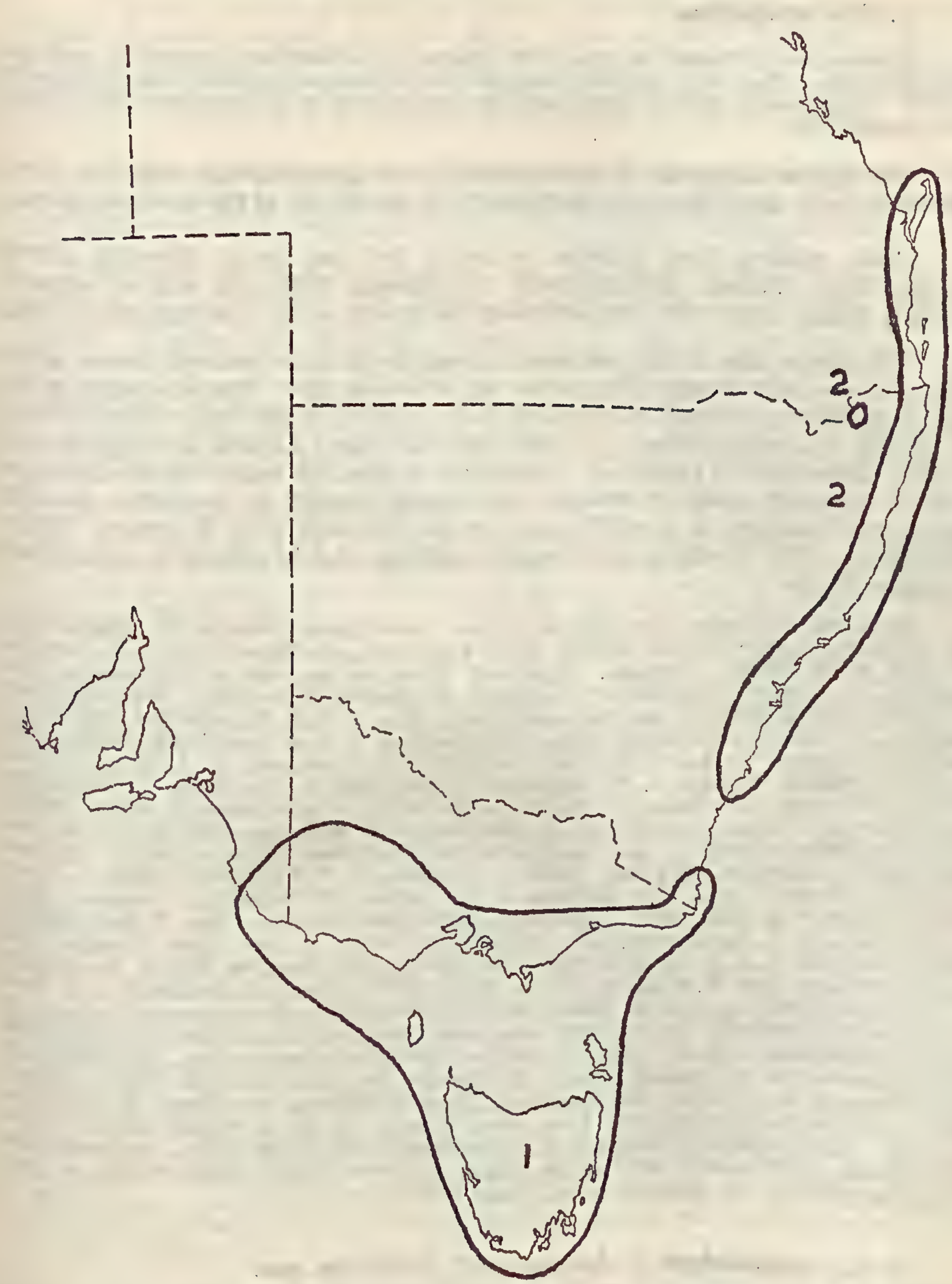


Fig. 1.—Distribution of *Restio tetraphyllus.* 1. ssp. *tetraphyllus.* 2. ssp. *meiostachyus.* There is a further outlying occurrence on Cape York Peninsula, not shown.

1. Female spikelets, in flowering stage, 5-10 mm. long; flowering glumes 3·5-5 mm. long. Male spikelets 5-7 mm. long; glumes 2-4 mm. long .... ssp. *tetraphyllus* a.

1.* Female spikelets, in flowering stage, 4-5 mm. long; glumes 2-3 mm. long. Male spikelets 2·5-3 mm. long; glumes 1·25-2 mm. long .... ssp. *meiostachyus* b.

a. Ssp. **tetraphyllus.**

TYPIFICATION: "Habitat in capite Van Diemen", Labillardière, presumably male and female SYNTYPES. Not seen, but both sexes are well represented in Labillardière's plates 226 and 227. A specimen in MEL ex Herb. Labill. is probably part of Labillardière's type material of the female plant.

The typical subspecies is characterised by the comparatively large size of the spikelets in both sexes, and more particularly by the length of the flowering glumes.

Male spikelets from globular to ovoid, 5-7 mm. long; flowering glumes 2-4 mm. long. Female spikelets ovoid to ellipsoid, 5-10 mm. long at anthesis; flowering glumes 3·5-5 mm. long including the mucro which is comparatively long.

The larger size of the spikelets appears to limit the number borne in the inflorescence, which ranges from a few up to about 200. The internodes of the sterile assimilatory branches often exceed 2 cm., which is much longer than is usually the case in ssp. *meiostachyus*. A male specimen from Condah in south-western Victoria, Green 6.1872 (MEL), is remarkable in that the mucro on the flowering glume is extremely small or obsolete and scarcely exceeds the perianth. In other respects this specimen is a good match for the specimen from Wimmera, Eckert, 1891 (MEL). It is flowering out of season and may also be affected to some extent by fungus disease.

SPECIMENS EXAMINED: NEW SOUTH WALES: *South Coast:* Murrica R., Disaster Bay, E. F. Constable 14.10.1954 (NSW 30875); Green Cape road, near Disaster Bay, E. F. Constable 13.6.1960 (NSW 52519). VICTORIA: Crawford's Creek on the road to Cabbage-tree, East Gippsland, C. French 1.1889 (MEL); Broadribb, F. Mueller 1853 (MEL); West Gippsland, F. Mueller 19.4.1853 (MEL); near Narracam Creek, Moe, P. R. H. St. John 20.4.1929 (MEL); Bunyip R., C. Walter 3.1904 (MEL); Wilson's Promontory, A. H. S. Lucas 1.1885 (NSW 47950); Dandenong Ranges, C. Davis 13.12.1942 (NSW 52331); Gembrook, C. S. Sutton 11.1901, 18.11.1922 (MEL); Emerald, J. P. McLennan 11.1904 (MEL); Frankston, J. Staer 4.1911 (NSW 49701); near Cape Otway, C. Walter 3.1887 (MEL); Curdie's Inlet, C. Walter (MEL); Glenthompson, N. Beggs 26.6.1922 (MEL); Grampians, H. B. Williamson 1899 (MEL); Wannon, Grampians, Wilhelmi (MEL); near Jervis's Station, Grampians, Wilhelmi (MEL); Portland, Allitt (MEL); Horsham, 20.2.1901 (MEL); Wimmera, J. P. Eckert 1891 (MEL). SOUTH AUSTRALIA: about 15 miles E of Millicent, R. L. Crocker 3.1939 (MEL). TASMANIA: King Island, C. French Jnr. 1887 (MEL); between Circular Head and Cape Grim, T. Smith (MEL); Circular Head, R. C. Gunn 31.12.1887 (NSW 49702); Blythe R., NW Coast, Oakden 3.1887 (MEL); Waratah, A. H. S. Lucas 12.1924 (NSW 49703); near Deloraine (MEL); Frenchman's Cap, Strzelecki, ex Herb. R. C. Gunn 331 p.p. (NSW 49705); Pieman R. Bridge, G. & C. Davis 8.1.1937 (NSW 52400); Meander R. (MEL); Madam Howard Plains, Queenstown to Strahan, L.A. S. Johnson 20.1.1949 (NSW 10427); Hente Siding near Strahan, G. and C. Davis 17.1.1937) NSW 53118); Lake Margaret, G. & C. Davis 8.1.1937 ex herb. F. A. Rodway No. 9407-9409 (NSW 49781); Queenstown to Derwent Bridge, R. Carolin No. 2163, 13.1.1960 (SYD); Honeywood, Huon area, Blyth (MEL); Melaleuca Inlet, Bathurst Harbour, Port Davey, M. Davis No. 1366, 16.3.1954 (MEL); Bramble Cove, Port Davey, C. Davis 9.2.1937 (NSW 53119); Southport, 12.1855 (MEL); Recherche, F. A. Rodway 12.1901 (NSW 5233); Recherche Bay, J. H. Maiden 3.1908 (NSW 49751); Cox Bight, C. Davis 1.1938 (NSW 49782); ex herb. Labillardière (MEL); van Diemen's Land, Stuart (MEL).

b. Ssp. **meiostachyus** *L. Johnson et O. Evans*, **ssp. nov.**

TYPIFICATION: Dee Why Lagoon, N.S.W., O. D. Evans & E. F. Constable 22.11.1960 (NSW 52852), female, HOLOTYPE. Dee Why Lagoon, O. D. Evans & E. F. Constable 22.11.1960 (NSW 52853), male, PARATYPE.

Spiculae foemineae globulares vel ovales vel ellipsoidales, ad anthesin 3-5 mm. longae, glumis fertilibus 2-3 mm. longis. Spiculae masculae globulares, 2·5-3·5 mm. longae, glumis 1·5-2 mm. longis. Spiculae utriusque sexus saepe numerosissimae, nonnumquam usque ad 400. Internodia ramulorum sterilium plerumque perbrevia. Chromosomata somatica 22.

Female spikelets globular to ovoid or ellipsoid, 3-5 mm. long in flowering stage; flowering glumes 2-3 mm. long. Male spikelets globular, 2·5-3·5 mm. long; flowering glumes 1·5-2 mm. long. Spikelets in both sexes often very numerous, sometimes up to 400. Internodes of the sterile assimilatory branchlets very short except in specimens grown in sheltered situations (or young plants?).

The most reliable and convenient diagnostic feature of the subspecies appears to be the shortness of the flowering glumes in the female spikelet. The chromosome number $2n = 22$ has been reported for this subspecies by Briggs (1963).

Specimens Examined: Queensland: *Cook District:* Dulhunty, Gulf side of Cape York Peninsula, F. W. Whitehouse (BRI 024607). *Wide Bay District:* Great Sandy Island (Fraser Is.) Sheridan (MEL, veg. only); Double Island Point, M. S. Clemens 15-17.10.1946 (BRI 017551); Coondoo Ck., NW of Mt. Coondoo, W. D. Francis 12.1919 (BRI 024623); Lake Cootharaba, Keys & Wedd (BRI 024621); Gympie district, F. H. Kenny 1907 (BRI 024618); Noosa, R. L. Higgins 3.1919 (BRI 024625). *Moreton District:* Mt. Cooroy, J. Staer 9.1911 (NSW 47930); Woombye, Field Naturalists' Society 5.1911 (BRI 024613, veg. only); Maroochie, F. M. Bailey (BRI 024636); Mooloolah Heads 4-5.1911 (BRI 024612); Landsborough to Caloundra, A. H. S. Lucas 1.1909 (NSW 47931); Caloundra, S. T. Blake No. 4899, 22.8.1933 (BRI 024742); Archer's Station (E. of Kilcoy), L. Leichhardt 23.9.1843 (MEL, veg. only); Glasshouse Mtns., F. M. Bailey 7.1879 (BRI 024617); Bribie Is., C. T. White 4.1915 (BRI 024606, 024619), 1.1919 (NSW 47932); Bribie Is., W. D. Francis 11.1919 (BRI 024611); south end, Bribie Is., C. E. Hubbard No. 2607, 18.5.1930 (BRI 024609); Stradbroke Is., C. T. White 3.1915 (NSW 47933); between Amity Point and Fern Gully, Stradbroke Is., C. E. Hubbard No. 2266, 19.4.1930 (BRI 024608); Amity Point, Stradbroke Is., C. T. White No. 6751, 19.4.1930 (BRI 024624); Dunwich, Stradbroke Is., S. T. Blake No. 5074, 12.1.1934 (BRI 024743); Southport, N. Michael 22.1.1936 (BRI 024610); Currumbin Ck., C. T. White 14.12.1907 (BRI 024622). New South Wales: *North Coast:* Byron Bay, J. H. Maiden & J. L. Boorman 11.1903 (NSW 47935); Clarence R., H. Beckler (MEL); Clarence R., Wilcox, 1872 (MEL); Hat Head, E. F. Constable 18.1.1953 (NSW 22071, 48995); Macleay R., W. Woolls (MEL, veg. only); Hastings R., H. Beckler (MEL); Kendall district, F. M. Bailey (jr.) 9.1932 (NSW 47937); Forster, L. Gilbert 9.11.1946 (NSW 47938); Bombah Point, Myall Lakes, E. F. Constable 20.1.1952 (NSW 19831); Shoal Bay, Port Stephens, L. A. S. Johnson 2.1947 (NSW 4941); Williamtown to Nelson's Bay, O. D. Evans 6.12.1961 (NSW 59930); near Anna Bay, L. A. S. Johnson & B. G. Briggs 27.1.1962 (NSW 60653); Newcastle (MEL); Belmont, J. W. Dwyer 3.1920 (NSW 47939). *Central Coast:* Brisbane Water (MEL); Cowan Ck., R. Fitzgerald 8.1873 (MEL); Dee Why, W. M. Carne 7.11.1914 (NSW 47941); Dee Why, O. D. Evans 23.2.1926 (SYD); Dee Why, H. K. C. Mair 1.1931 (SYD); Dee Why Lagoon, O. D. Evans & E. F. Constable 22.11.1960 (NSW 52852, Holotype; 52853, Paratype); Dee Why Lagoon, L. A. S. Johnson 9.9.1961 (NSW 56884); Dee Why Lagoon, B. G. Briggs & L. A. S. Johnson 6.1.1962 (NSW 56877); Manly Beach (MEL); Port Jackson, J. H. Camfield 12.1897 (SYD); Port Jackson, J. L. Boorman 1.1908 (in Kneucker, Cyp. etc. exsicc. No. 200, NSW 47942); Centennial Park, W. Forsyth 11.1892 (NSW 47943); Randwick, C. Wilhelmi 11.1863 (MEL); Botany Bay, Deane 6.1884 (NSW 60882); Botany Bay, Dixon 7.1903 (NSW 47944); Ramsgate Park, Botany Bay, J. H. Camfield 10.11.1902 (NSW 47945); Botany Bay, J. H. Camfield 4.12.1897 (BRI 024620); Botany Bay, J. L. Boorman 1.1908 (NSW 50802); New Holland (Botany Bay), Banks & Solander, 1770 (NSW 51184, MEL); New Holland, F. Sieber, Agrostotheca No. 34 (MEL); Woodhill Bluff, 2 miles NW of Berry, F. A. Rodway 14.8.1949 (NSW 53120); Berry, E. J. McBarron No. 5269, 5.11.1950 (NSW 47946). *South Coast:* Jervis Bay, J. H. Maiden 7.1899 (NSW 47947); Jervis Bay, F. A. Rodway 1.1926 (NSW 49706); Conjola, W. Heron 11.1898 (NSW 47948); Narrawallee, Milton, R. H. Cambage No. 3499, 27.12.1911 (NSW 47949, 48996; SYD); Milton, W. Bäuerlen, 1883 (MEL). *Northern Tablelands;* Sandy Ck., Upper Clarence R. district [C. Stuart], No. 837 (MEL); Timbarra, upper Clarence R. district [C. Stuart], No. 839 (MEL); New England, C. Stuart (MEL).

The widely outlying occurrence on Cape York Peninsula is remarkable. Search for the subspecies in the intervening areas of coastal Queensland is needed. Search is also desirable in the Timbarra district of the Northern Tablelands of New South Wales, where the plant has not been collected for almost a century. A recent attempt to find it in this area was unsuccessful.

Although the subspecies is usually found in swampy heath ("wallum") and swamp forest (*Melaleuca* or *Eucalyptus*), one of us (L. J.) has seen it in tall rainforest on sand near the sea, at Noosa, Queensland.

ACKNOWLEDGMENTS

Our thanks are due to the Directors of the Brisbane (BRI) and Melbourne (MEL) Herbaria and to Dr. R. C. Carolin, Curator of the Herbarium, Botany Department, University of Sydney (SYD), for the loan of specimens.

LITERATURE CITED

Briggs, B. G., 1963.—Chromosome Numbers in *Lepyrodia* and *Restio* in Australia. Contrib. N.S.W. Nat. Herb. III, 228-232.

Intrageneric Groups and New Species in *Lepyrodia*

L. A. S. JOHNSON AND O. D. EVANS

SUMMARY

The Australian species of *Lepyrodia* are found to fall into two clear-cut groups on the basis of differences in the stem chlorenchyma. External morphological characters to distinguish these groups, as such, have not been found but they are supported by chromosome number differences, so far as these are known. The single New Zealand species differs anatomically and morphologically from both of these groups and is probably best distinguished as the separate genus *Sporadanthus* F. Muell. Two new species are described from northern New South Wales and southern Queensland, viz. *L. leptocaulis* and *L. caudata*. Plants from the Grampians, Victoria, formerly referred to *L. interrupta* F. Muell., are shown to belong in a different anatomical group from that species and are raised to specific rank as *L. flexuosa* (Benth.) stat. nov.

In dealing with Restionaceae for the Flora of New South Wales, investigation of the genus *Lepyrodia* has shown that there are several undescribed species in eastern Australia. The unrecognised existence of these has in the past rendered uncertain the definition of some of the known species. The delimitation of the latter will be clarified in the Flora but three species will be described here, two of which are new. The third has been treated as a variety of a species to which it is not closely related.

In the course of this study it has been found that the Australian species of *Lepyrodia* fall into two groups on the basis of stem anatomy. These differ in the following respects: Group A has the chlorenchyma of the stems clearly demarcated into an outer zone of palisade tissue and an inner zone of spongy chlorenchyma. Group B has no spongy tissue, but the palisade, in two or more series, occupies the whole space between the epidermis and the parenchymatous sheath (apart from the thick-walled supporting cells lining the substomatal cavities, which are found in both groups).

The species examined, from both Eastern and Western Australia, fall into these groups as follows: Group A: *L. scariosa* R.Br., *L. muelleri* Benth., *L. leptocaulis* L. Johnson et O. Evans, *L. flexuosa* (Benth.) L. Johnson et O. Evans, *L. anarthria* F. Muell., *L. hermaphrodita* R.Br., *L. macra* Nees, *L. valliculae* J. M. Black. Group B: *L. gracilis* R.Br., *L. tasmanica* Hook. f., *L. interrupta* F. Muell., *L. caudata* L. Johnson et O. Evans, *L. muirii* F. Muell., *L. stricta* R.Br., *L. glauca* F. Muell.

Material of *L. monoica* F. Muell., *L. drummondiana* Steud., and *L. anaectocolea* F. Muell. has not been available.

It has not been possible to find any features of external morphology to divide the species into these groups, and indeed some species of one group are superficially very similar to, and have been confused with, certain species of the other group. For example, *L. caudata* (Group B) outwardly resembles *L. muelleri* and *L. scariosa* (Group A), and *L. flexuosa* (Group A) has been included in *L. interrupta* (Group B).

Strong support for the division into these anatomically recognisable groups is provided by the cytological evidence (Briggs 1963). All cytologically investigated species (6 out of 8) of Group A have the chromosome number $2n = 14$ while all species studied (3 out of 7) of Group B have $2n = 18$.

The single extra-Australian species is the New Zealand *L. traversii* F. Muell., which has also been referred to a distinct genus *Sporadanthus* F. Muell. on the basis of its unilocular and one-seeded fruit. Cheeseman (1925) stated that he could " find no trace of the ovary being 3-celled, or of there being more than one ovule " and that he thought that ultimately Mueller's view that *Sporadanthus* was generically distinct would be substantiated. The stem anatomy of this species is very distinct from that in both Australian groups of *Lepyrodia*. The chlorenchyma is arranged in a series of radially arranged plates one cell thick, separated by air-spaces. This is illustrated by Gilg (1891) under the name of "*Leptocarpus*? " and Gilg's figures are reproduced by Gilg-Benedict (1930) as *Lepyrodia traversii*. The present studies have confirmed that the anatomy is essentially as shown by Gilg but that the individual chlorenchyma cells are frequently much more elongated radially than indicated in his figures. A chromosome number determination on this species is much to be desired, but there is probably a good case for its segregation as a distinct genus.

L. flexuosa (*Benth.*) *L. Johnson et O. Evans*, **stat. nov.**

L. interrupta F. Muell. var. *flexuosa* Benth., Fl. Austral. VII (1878) 217, Basionym.

Holotype: " Victoria, Grampians, D. Sullivan ". There are three undated sheets in MEL with this information all belonging to the present form. A fourth specimen, dated 1879, was collected too late to be a type. Doubtless a piece at Kew would be the holotype but the MEL material, the brief description and the reference to Mueller's notes in Fragm. VIII (1873) 76 are sufficient to fix the identity.

In view of the sketchiness of the varietal description new Latin and English descriptions are given.

Monoica. Culmi basi caespitosi, erecti vel plus minusve scandentes vel aliquando decumbentes, multum ramosi, usque ad 2 m. longi (vel longiores?), 2-3 mm. diametro versus basin, superficie laeves sed haud nitentes; vaginae si ramos haud subtendentes arcte appressae vel si ramos subtendentes laxae, truncatae, plus minusve striatae, pallidae, haud nitentes, usque ad 2·5 cm. longae, laminam brevem teretem sed saepe abruptum ferentes. Inflorescentia laxe paniculata 30 cm. longa (vel longior), ramibus elongatis saepe flexuosis, unoquoque flores arctos sessiles vel breviter pedicellatos in fasciculis distantibus vel in ramulis brevibus floriferis ferenti. Bracteae principales breves, latae, laxae, striatae, pallidae, apice brevi tereti saepe reflexo. Flores masculi foemineique in eadem inflorescentia, vel in fasciculis separatis vel mixti. Glumae bracteolaeque floribus multum breviores, ovatae, acuminatae, saepe apice brevi tereti. Tepala lanceolata, acuta, firma, 2·5-3 mm. longa, externis aliquantulum interna excedentibus, purpurascentia. Capsula depressa, triangularis. Semina ellipsoidea, castanea, circiter 0·8 mm. longa.

Monoecious. Culms apparently tufted at the base, erect, scrambling or trailing, branched more or less throughout, up to 2 m. or more long, 2-3 mm. diam. near the base, smooth but dull; sheaths closely appressed when not subtending branches, otherwise loose, truncate, more or less striate, pale, dull, up to 2·5 cm. long, bearing a short terete lamina which however is often broken off. Inflorescence a loose panicle 30 cm. or more in length, with elongated, often flexuose branches, each bearing either distant clusters of crowded sessile or shortly pedicellate flowers or short, flowering branchlets or both. Bracts subtending each cluster of flowers or group of branches short, broad, loose, striate, pale, with a short, often reflexed terete apex. Male and female flowers in the same inflorescence, either in separate clusters or mixed. Glumes and bracteoles much shorter than the flowers, ovate, acuminate, often with a short terete apex. Tepals lanceolate, acute, firm, 2·5-3 mm. long, the outer slightly shorter than the inner, purplish. Capsule depressed 3-angular. Seeds ellipsoid, brown, ca. 0·8 mm. long.

DISTRIBUTION: Confined to the Grampians, Western Victoria.

SPECIMENS EXAMINED: VICTORIA: Grampians, D. Sullivan (MEL), ISOTYPE; Grampians, D. Sullivan 1879 (MEL); Grampians, C. Walter 11.1900 (NSW 48371); Grampians, H. B. Williamson 11.1903 (MEL); Grampians, C. S. Sutton 12.1904 (MEL); at foot of Mt. Abrupt, Grampians, H. B. Williamson 12.1899 (MEL; NSW 48372); Fagan's Creek, Hall's Gap, Grampians, St. Eloy Dalton (MEL); Mt. Victory road, Grampians, M. E. Phillips 30.10.1960 (NSW 57788; 57789); Mt. Rosea road, Grampians, M. E. Phillips No. 707, 22.3.1961 (NSW 57787); Moora road, Grampians, M. E. Phillips 13.9.1961 (NSW 57790); Stawell, Upper Wimmera River, W. E. Matthews 1893 (MEL).

This Grampians endemic was treated by Bentham as a variety of *L. interrupta* F. Muell., a species of " wallum " country on coastal sands in southern Queensland and on the North Coast of New South Wales. As pointed out above, *L. interrupta*, on anatomical grounds, belongs in a different subgroup of the genus from *L. flexuosa*. The resemblance between the two species lies chiefly in the interrupted inflorescence of flower clusters and in the outer tepals being somewhat shorter than the inner. However, apart from the differentiation of the chlorenchyma into palisade and spongy tissue, *L. flexuosa* differs from *L. interrupta* in the frequently scrambling or trailing habit, the much longer and more branched culms which are also thicker at the base, the dull surface of the culms, the longer, pale, dull, striate sheaths and the pale primary bracts. Unfortunately the chromosome number of *L. flexuosa* is as yet unknown.

L. leptocaulis *L. Johnson et O. Evans.*

HOLOTYPE: 2 miles W of Torrington, on Tungsten road, N.S.W., E. F. Constable 26.3.1962 (NSW 57104).

Monoica. Rhizoma repens vel caespitosum, glabrum, squamis scariosis imbricatis plus minusve indutum, 2-4 mm. (raro 5 mm.) diametro (squamis inclusis). Culmi erecti, tenaces, simplices vel ramosi, 0·5-0·75 mm. diametro, 15-30 cm. alti, glabri vel superficie minute rugulosi vel foveolati raro laeves; vaginae si ramos haud subtendentes appressae vel si ramos subtendentes laxae, saepe aliquanto reflexae, raro adpressae, 6-15 mm. longae apice truncato, lamina tereti vel semi-tereti 1-5 mm. longa, auriculis duabus membraneis. Inflorescentia paniculata, angusta, terminalis, floribus usque ad 30; bracteae principales laxae vaginibus similes sed sursum sensim diminutae; bracteae ramorum lateralium et florales scariosae, lanceolatae, acutae; bracteolae membraneae, acutae. Flores masculi foemineique saepe in eadem inflorescentia, masculis supra, foemineis versus basin; tepala interna externaque subaequalia vel externa aliquantulum longiora. Flores masculi tepalibus anguste lanceolatis 2-3 mm. longis, foeminei tepalibus lanceolatis vel late lanceolatis 1·5-2·5 mm. longis. Capsula trilocularis, depresso-globosa, seminibus ellipsoideis canescentibus, circiter 0·75 mm. longis. Chromosomata somatica 14.

Monoecious. Rhizome creeping or tufted, glabrous, more or less covered with imbricate scarious scales, 2-4 mm. (rarely -5 mm.) diam., overall. Culms erect, wiry, simple or branched, 0·5-0·75 mm. diam., 15-30 cm. high, glabrous, but with the surface minutely wrinkled or pitted, rarely smooth; sheaths appressed when not subtending branches, otherwise loose, often somewhat reflexed, 6-15 mm. long, the apex truncate, with a terete or semi-terete lamina 1-5 mm. long and two membranous auricles; the lamina however is often broken off. Inflorescence a narrow terminal panicle consisting of up to 30 flowers; principal subtending bracts loose, similar in shape to the sheaths on the culm but diminishing in size upwards. Bracts on the lateral branches and those subtending each flower scarious, lanceolate, acute. Bracteoles membranous, acute. Male and female flowers often in the same inflorescence, the males above, the females near the base; inner and outer tepals about the same length or the outer slightly longer. Male flowers: tepals narrow-lanceolate, 2-3 mm. long. Female flowers: tepals lanceolate to broad-lanceolate 1·5-2·5 mm. long. Capsule 3-locular, depressed-globose; seeds ellipsoid, greyish, ca. 0·75 mm. long. Chromosome No. $2n = 14$ (Briggs 1963).

DISTRIBUTION: Northern part of the Northern Tablelands and North-west Slopes of New South Wales and adjacent parts of Queensland, on acid granite country, in moist places.

QUEENSLAND: *Darling Downs District:* Stanthorpe, J. L. Boorman 24.8.1904 (NSW 57755). NEW SOUTH WALES: *North-west Slopes:* Gilgai, S of Inverell, A. W. Jessup and M. Gray No. 347, 8.12.1953 (NSW 48177). *Northern Tablelands:* near Torrington, M. E. Phillips No. 212, 22.2.1961 (NSW 56922); 2 miles W of Torrington, E. F. Constable 13.5.1961 (NSW 56903), 26.3.1962 (NSW 57104, HOLOTYPE; 61063).

L. leptocaulis, a member of Group A on anatomical and cytological features, is related to *L. muelleri* Benth., and has been referred to that species in the past, as a form. The two may be regarded as a pair of vicarious species but *L. leptocaulis* is sharply distinguished from all forms of the rather variable *L. muelleri* by its very slender stems (whence the epithet "*leptocaulis*") and by the loose and often reflexed sheaths. It apparently does not always inhabit such wet places as *L. muelleri*, which is usually found in very wet peaty soil, often with standing water for long periods. It is distinguished from *L. scariosa* R.Br. by the monoecious condition, the slender culms, and the pale sheaths.

L. caudata *L. Johnson et O. Evans*, n. sp.

HOLOTYPE: 1½ miles NW of Lennox Head, N.S.W., E. F. Constable 24.5.1962 (NSW 61208).

Probabiliter dioica. Rhizoma repens, glabrum, squamis appressis plus minusve indutis, diametro 3-8 mm. squamis inclusis. Culmi erecti, simplices vel ramosi, usque ad 3 mm. diametro, 75-200 cm. alti, glabri. Vaginae partis superioris culmi arcte adpressae, glabrae, nitento-castaneae, minute punctatae seriebus transversis stomatum, apice rotundato truncatove margine aliquantulum irregulari membranea, aliquando in laminam brevem teretem basi ligulatam productae. Inflorescentia terminalis, breviter paniculata, 2-10 cm. longa, floribus crebris in ramis lateralibus. Bractea principalis infima vaginibus similis vel apice acuto scariosoque; bracteae ramorum lateralium et glumae membraneae, apice acuto acuminatove saepe filiformi longitudine quartam vel tertiam partem laminae aequans. Bracteolae membraneae, acutae acuminataeque, apice filiformi. Tepala rigida acuta, internis externisque subaequalibus vel externis aliquantulum longioribus. Flores masculi tepalis lanceolatis vel anguste lanceolatis, 2·5-4 mm. longis, foeminei tepalis lanceolatis vel late lanceolatis 2·0-3·0 mm. longis, ovario triloculari. Capsula non visa. Chromosomata somatica 18.

Apparently dioecious. Rhizome creeping, glabrous, partly or wholly covered by appressed scales; diam. over all 3-8 mm. Culms erect or scrambling, simple or branched, up to 3 mm. diam., 75-200 cm. high, glabrous. Sheaths on the upper portion of the culm closely appressed, glabrous, shining brown, minutely pitted with transverse rows of stomata, the apex rounded or truncate with a slightly irregular membranous margin and sometimes produced into a short terete lamina with a ligule at the base. Inflorescence a short terminal panicle, 2-10 cm. long, with the flowers closely crowded on the lateral branches. Lowest subtending bract on the main axis of the inflorescence similar to the sheaths or the apex acute and scarious; bracts on the lateral branches and the glumes subtending each flower membranous, the apex acute or acuminate, often filiform and one quarter or one third as long as the lamina. Bracteoles membranous, acute or acuminate, with a filiform apex. Tepals rigid, acute, the inner and outer whorls about the same length or the outer slightly longer. Male flowers: tepals lanceolate to narrow-lanceolate, 2·5-4 mm. long. Female flowers: tepals lanceolate to broad-lanceolate 2·0-3·0 mm. long.; ovary 3-locular. Capsule not seen. Chromosome No. $2n = 18$ (Briggs 1963).

DISTRIBUTION: Coastal districts of southern Queensland and far North Coast of New South Wales, in wet peaty places in " wallum " or deep sands.

SPECIMENS EXAMINED: QUEENSLAND: *Moreton District:* Caloundra, S. T. Blake 24.8.1932 (BRI 032813); Beerwah, E. F. Constable 27.5.1962 (NSW 61059; 61060); Bribie Is., C. T. White 9.1913 (NSW 48342), 4.1915 (BRI 032805); Bribie Is., S. T. Blake No. 4833, 5.6.1933 (BRI 032818; NSW 57800); Moreton Is., C. T. White 4.1924 (BRI 032808); Stradbroke Is., C. T. White 3.1915 (BRI 032801, 032806); Stradbroke Is., C. E. Hubbard No. 2250, 19.4.1930 (BRI 032804). NEW SOUTH WALES: *North Coast:* 1 mile W of Byron Bay, L. A. S. Johnson 24.4.1962 (NSW 57080); 1½ miles NW of Lennox Head, L. A. S. Johnson & E. F. Constable 12.6.1957 (NSW 48339); 1½ miles NW of Lennox Head, E. F. Constable 24.5.1962 (NSW 61208, HOLOTYPE; 61209).

L. caudata, which is named from the attenuate tail-like points of the glumes and bracteoles, gave great trouble in its initial discrimination from *L. muelleri* and *L. scariosa.* However, the anatomical character of all-palisade chlorenchyma placed these specimens in Group B, whereas *L. muelleri* and *L. scariosa* belong to Group A. The chromosome number determinations confirmed this grouping and it is now clear that the resemblances between *L. caudata* and the other two species mentioned are superficial. It is now known that the range of *L. muelleri* does not in fact extend as far north as the territory of *L. caudata*, but forms of *L. scariosa* and *L. caudata* may grow side by side, and some collections were mixed. In cases of doubt microscopic examination of a transverse section of a culm will provide a certain separation, but *L. caudata* may also be distinguished from *L. scariosa* by the appressed sheaths, the shining surface of culms and sheaths with stomates very obvious under a hand lens (× 10), and by the long filiform points on the glumes and bracteoles. The last two features will also distinguish it from *L. muelleri.*

ACKNOWLEDGMENTS

Our thanks are due to the Directors of the Melbourne and Brisbane Herbaria for the loan of specimens and to Mr. E. F. Constable, Official Collector, National Herbarium of New South Wales, for diligent collecting of much fresh and herbarium material for study. The clear discrimination of *L. caudata* was made much more satisfactory by the cytological studies of Dr. Barbara Briggs, whom we wish to thank for her close co-operation at all stages of the work.

LITERATURE CITED

Briggs, B. G., 1963.—Chromosome numbers in *Lepyrodia* and *Restio* in Australia. Contrib. N.S.W. Nat. Herb. III, 228-232.

Cheeseman, T. F. 1925.—Manual of the New Zealand Flora. Wellington.

Gilg, E. 1891.—Beiträge zur vergleichenden Anatomie der xerophilen Familie der Restiaceae. Bot. Jahrb. XXX, 541-606.

Gilg-Benedict, C. 1930.—Restionaceae. *In* Engler, Die Natürlichen Pflanzenfamilien, ed. 2, XVa, 8-27. Leipzig.

Chromosome Numbers in *Lepyrodia* and *Restio* in Australia

Barbara G. Briggs

Summary

Chromosome numbers of $2n = 14$ (five species) and $2n = 18$ (three species) have been obtained in *Lepyrodia* while numbers of $2n = 14$, 22, 24, 32 and ca. 44 are represented in the fourteen species of *Restio* studied. These include most of the eastern Australian species of both genera, but only a few from Western Australia. It is suggested that the basic number for the family in Australia may be either $x = 7$ or $x = 11$.

This investigation was carried out in association with the taxonomic studies of Johnson and Evans (1963 a, b, c and in preparation for Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 25). These authors give descriptions and discussion of the New South Wales species and include details of most of the voucher specimens cited below. The only previous cytological record in the Restionaceae is $2n = 32$ for the South African *Hypodiscus aristatus* Nees (Krupko 1962); however Sands (unpublished) has obtained counts of $n = 11$ in *Leptocarpus tenax* (Labill.) R.Br.

The chromosome numbers listed in Table I include all the eastern Australian species of *Restio* and most eastern species of *Lepyrodia* but only a few from Western Australia. Counts were made on orcein-stained squash-preparations, mostly from the vegetative buds which continue the growth of the rhizomes or which develop new culms. Some counts were made from immature embryos or root tips but the latter did not usually give satisfactory material.

Table I.—CHROMOSOME NUMBERS IN *LEPYRODIA* AND *RESTIO*

Localities are within N.S.W. unless otherwise indicated. The sex of the plant is noted where determinable; no distinction is made between plants with both male and female flowers on the same individual and those with hermaphrodite flowers.

Species	$2n$	Locality	Sex	Voucher No. Herb. N.S.W.
Lepyrodia muelleri Benth.	14	Wallaby Swamp, near Putty	⚥	57456
L. leptocaulis L. Johnson et O. Evans.	14	Torrington	⚥ ⚥	57104, 61063
L. scariosa R.Br.	14	Beerwah, Qld.	♂	61061
	14	King John Ck., near Caloundra, Qld.	♀	61067
	14	Clarence	♀	57107
	14	Blackheath	..	57455
L. anarthria F. Muell.	14	Wyberba, Qld.	♂	61068
	14	Clarence	♀	57108
	14	Centennial Park, Sydney	♀	60693
L. hermaphrodita R.Br.	14	Mt. Barker, W.A.	⚥	57060
L. gracilis R.Br.	18	Blackheath	♀	61066
	18	Centennial Park	..	57719
	18	Malabar	♂	61065

Species	$2n$	Locality	Sex	Voucher No. Herb. N.S.W.
L. interrupta F. Muell.	18	Lennox Head	..	57079
	18	Hat Head	♂	60649
L. caudata L. Johnson et O. Evans.	18	Beerwah, Qld.	♂	61059
	18	Byron Bay	♂	57080
	18	Lennox Head	..	61208, 61209
Restio fastigiatus R.Br.	14	Terrey Hills	..	57117
	14	Manly	♀	56882
	14	North Head	..	60722
R. dimorphus R.Br.	14	Terrey Hills	♂	57116
	14	Manly	..	60690
R. complanatus R.Br.	24	Terrey Hills	..	61058
	24	Dee Why	..	......
R. tetraphyllus Labill. ssp. *meiostachyus* L. Johnson et O. Evans.	22	Anna Bay	♂	60653
	22	Dee Why	..	56884
R. australis R.Br.	24	Blackheath	♂	57029
	24	Katoomba	♀	60800
	24	Kosciusko	..	57042
	24	Nimmitabel	♀	57026
R. stenocoleus L. Johnson et O. Evans.	22	Wyberba, Qld.	♀	57074
	22	Ebor	♂, ♂, ..	60640, 60642, 60870
	22	Gloucester Tops	♀, ♀, ♂	61054, 61055, 61057
R. stenocoleus form	22	Barrington Tops	♀	61207
R. longipes L. Johnson et O. Evans.	22	Clyde Mtn.	♀	60639
R. gracilis R.Br.	22	Pigeon House Ra.	♀	56887
R. fimbriatus L. Johnson et O. Evans.	22	Torrington	♂	57024
	22	Windsor—Putty	♀, ♂	57111, 57112
	22	Blackheath	♀	57028
	22	Katoomba	♀	57078
	22	Wentworth Falls	♂	57077
R. pallens R.Br.	22	Broadwater	♀	57081
	22	Agnes Banks	♀, ♂	60802, 60801
R. tenuiculmis S. T. Blake	14	Wardell	♀, ♂	56550, 60720
	14	Broadwater	♀	57082
R. monocephalus R.Br.	32	Mt. Tim Sheay, Tas.	♀	60889
R. nitens Nees	ca. 44	Mt. Pleasant, W.A.	♂	57424
R. stenostachyus W. V. Fitzg.	22	Mt. Pleasant, W.A.	♂	57423

The *Lepyrodia* species studied fall into two chromosome number groups, with $2n = 14$ and $2n = 18$ respectively; present information does not indicate which is the more primitive. Johnson and Evans (1963 c) indicate that these correspond with groups distinguished by characteristics of the chlorenchyma of the culms. The chromosomes, particularly in the $2n = 14$ group, are larger than in many Restionaceae (Fig. 1) but detailed studies of the karyotype have not been attempted.

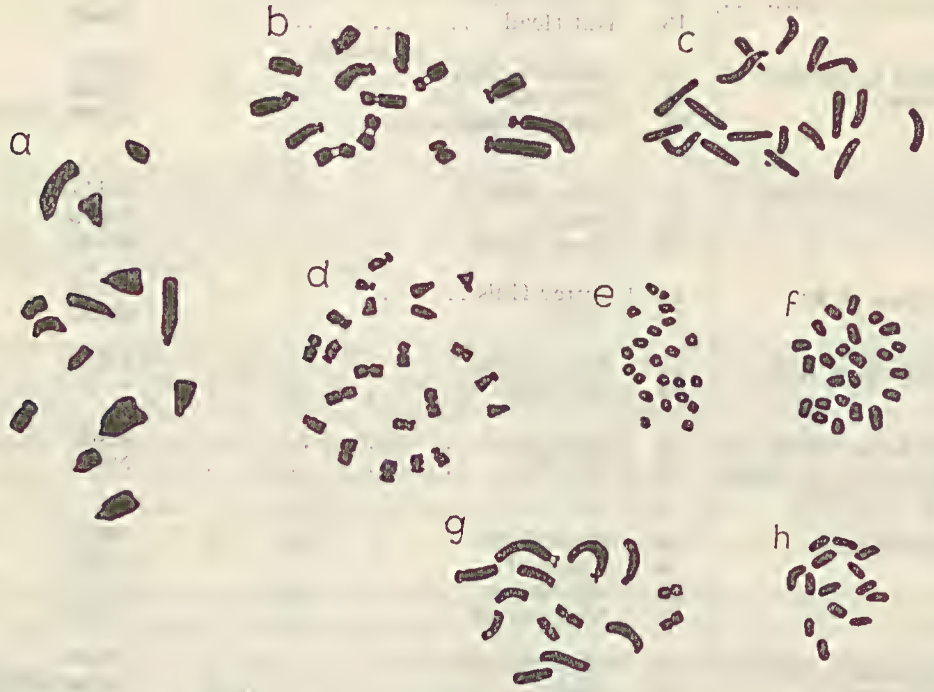


Fig. 1.—Mitotic chromosome complements, a. late prophase, b-h. metaphase. All × 1800. a. *Lepyrodia leptocaulis* (NSW 61063) $2n = 14$. b. *L. scariosa* (NSW 61061) $2n = 14$. c. *L. caudata* (NSW 57080) $2n = 18$. d. *Restio fimbriatus* (NSW 57112) $2n = 22$. e. *R. tetraphyllus* (NSW 60653) $2n = 22$. f. *R. australis* (NSW 57042) $2n = 24$. g. *R. tenuiculmis* (NSW 56550) $2n = 14$. h. *R. dimorphus* (NSW 60690) $2n = 14$.

Among the eastern Australian species of *Restio* the number $2n = 22$ is found in five species of the *R. gracilis* group (*R. stenocoleus* to *R. pallens* in Table 1) and in *R. tetraphyllus*. It also occurs in the Western Australian *R. nitens* and *R. stenostachyus*. The last named three species do not appear to be closely allied to each other or to the *R. gracilis* group. Deviation from this number was noted in *R. australis* which is morphologically consistent with other members of the *R. gracilis* group, and shows particular affinity to *R. stenocoleus*. Plants from Barrington Tops, listed as "*R. stenocoleus* form" show some approach in morphological features to *R. australis* but have $2n = 22$ as in *R. stenocoleus*. These are discussed by Johnson and Evans (1963 a); further cytological study of populations in this region is desirable. *R. complanatus* shares with *R. australis* the number $2n = 24$ but appears to be without close allies in eastern Australia and shows marked differences from the latter species.

Counts of $2n = 14$ were obtained on *R. tenuiculmis*, *R. dimorphus* and *R. fastigiatus*. The chromosomes of these species, particularly the first, are larger than in those with $2n = 22$ but are nevertheless too small and deficient in distinctive features to enable the individual chromosomes to be characterised and the karyotypes to be differentiated. No features of external morphology or anatomy have been found by which *R. tenuiculmis* can be separated from the *R. gracilis* group, although it shows much more frequent branching of the culms than is usual in that group. Despite some differences in inflorescence and anatomy (Johnson unpublished), the other two species appear to be allied to each other but show no morphological evidence of close relationship to *R. tenuiculmis.* The Tasmanian endemic *R. monocephalus,* which shows yet another chromosome number, does not appear to have close allies and no comment can be made on its relationships.

Reported occurrences of interspecific hybridization in the *R. gracilis* group (Johnson and Evans 1963 a) are in general accord with the pattern of chromosome numbers. Thus no hybrids are known where *R. pallens* grows with *R. tenuiculmis* or where *R. australis* is in contact with *R. fimbriatus* or *R. longipes.* However, *R. fimbriatus* and *R. stenocoleus* appear to hybridize extensively in various localities on the northern tablelands of New South Wales, although no hybrids have been reported in the few situations where *R. fimbriatus* comes into contact with *R. gracilis. R. dimorphus* and *R. fastigiatus,* which have the same chromosome number, frequently occur in close proximity but hybrids between them have not been found; although these species appear to be allied, the relationship may not be particularly close.

The anatomical (Gilg-Benedict 1930, Johnson unpublished) and cytological diversity within the Australian species of *Restio* suggests that these may have had several separate origins. Furthermore, morphology and anatomy indicate that the genera *Restio, Hypolaena* and *Leptocarpus,* previously regarded as common to South Africa and Australia, are not natural groups but are probably the result of convergent developments in the two continents. Much further study of species is required in both areas and cytological information on the African members may be particularly valuable.

The present studies, together with others which will be presented separately, have shown that the numbers $n = 7, 8, 9, 11, 12$ and 13 (and some polyploid derivatives) are represented in the family. Their distribution among genera indicates that attention should be directed to the numbers 7 and 11 in attempting to suggest a basic number for the family. Numbers based on 11 have been found in *Anarthria, Restio, Leptocarpus, Hypolaena* and *Coleocarya.* Among these diverse genera, only *Leptocarpus* and *Hypolaena* appear to be closely allied, while *Anarthria* is significant in showing several apparently primitive features. On the other hand, $n = 7$ is common to some species of each of the rather distantly related genera *Restio, Lepyrodia* and *Lyginia;* the latter two, although very different from each other, show some primitive features. The number $n = 11$ occurs in most of the species of the *Restio gracilis* group but also in several very different species outside this complex. Similarly, 7 is represented in *R. tenuiculmis,* which is morphologically similar to species of the *R. gracilis* group, but this number is also found in the dissimilar *R. dimorphus—R. fastigiatus* group. These facts indicate that, if one of these numbers is primitive within the genus, there must have been parallel trends either in morphological features or in chromosomal evolution. Present evidence does not enable the basic number in the family to be suggested with any certainty. More extensive studies, both in Australasia and South Africa, may provide further understanding of the relationships and the apparently complex evolutionary patterns in the Restionaceae and within its individual genera.

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I am greatly indebted to many who went to considerable trouble to obtain living plants for study and thus enabled this work to be more extensive than would otherwise have been possible. I therefore wish to thank Mr. R. D. Royce and Mr. A. George (State Herbarium of Western Australia), Dr. S. T. Blake (Botanic Museum and Herbarium, Brisbane), Mr. J. B. Williams (University of New England), Mr. A. B. Costin (Division of Plant Industry, C.S.I.R.O., Canberra), Mr. P. Burgess (Forestry Office, Taree), Mr. E. J. McBarron (Glenfield Veterinary Research Station) and Dr. Joyce Vickery (National Herbarium of New South Wales). Particular thanks are due to Mr. E. F. Constable, official collector at the National Herbarium, who obtained material of many of the species studied.

LITERATURE CITED

Johnson, L. A. S. and Evans, O. D., 1963 a.—A revision of the *Restio gracilis* complex. Contrib. N.S.W. Nat. Herb. III, 200-217.

————————, 1963 b.—Geographic races in *Restio tetraphyllus*. Contrib. N.S.W. Nat. Herb. III, 218-222.

————————, 1963 c.—Intrageneric Groups and New Species in *Lepyrodia*. Contrib. N.S.W. Nat. Herb. III, 223-227.

Gilg-Benedict, C., 1930.—Restionaceae. *In* A. Engler, Die Natürlichen Pflanzenfamilien, ed. 2, XVa: 8-27.

Krupko, S., 1962.—Embryological and cytological investigations in *Hypodiscus aristatus* Nees. Journ. South Afr. Bot. XXVIII, 21-44.

The Bleeser Botanical Collection from Northern Australia

H. S. McKee*

O. Schwarz (1927) published 43 new specific names based on specimens collected in the Darwin area by F. A. K. Bleeser. The type specimens, deposited in the Berlin Herbarium, seem to have been destroyed. It is therefore important for the botany of northern Australia to know whether duplicates of the type material are available elsewhere. Professor Schwarz (now of the Institut für spezielle Botanik of the Friedrich Schiller University, Jena) stated in a letter dated 5th December, 1961, that he knew of no distribution of Bleeser specimens from Berlin to other institutions. He added, however, that Bleeser kept duplicates which he could have named from the determinations sent to him.

Inquiries at the Arnold Arboretum, Kew, and several Australian herbaria have failed to locate any substantial number of Bleeser duplicates. The National Herbarium, Sydney, holds the numbers listed below which are relevant to names established by Schwarz (1927):

Bleeser 146. Duplicate of the type number of *Spermacoce involucrata* O. Schwarz.

Bleeser 244. Duplicate of a syntype of *Cynanchum dichasiale* O. Schwarz. Blake (1948) examined this specimen and referred it, together with the other syntype (Bleeser 586) to *Secamone elliptica* R. Br. Bleeser 586, cited by Blake (1948) from the National Herbarium of New South Wales, has not been found there during the present study.

Bleeser 297. Duplicate of the type number of *Sideroxylon portus-darwini* O. Schwarz. This was reduced to *Planchonella arnhemica* (F. Muell.) Royen by van Royen (1957). The description by Schwarz is based on fruiting material only but flowers are present on Sydney specimens.

Bleeser 315. Duplicate of a syntype of *Ilysanthes mitrasacmoides* O. Schwarz.

Bleeser 332. Duplicate of the type number of *Alectryon bleeseri* O. Schwarz (determined at Sydney as *Cupaniopsis anacardioides* (A. Rich.) Radlk.). Blake (1954) also reduced *A. bleeseri* to this species.

Bleeser 360. Duplicate of the type number of *Stylidium multiscapum* O. Schwarz.

Bleeser 371. Duplicate of the type number of *Loranthus bleeseri* O. Schwarz (determined at Sydney as *Dendrophthoe odontocalyx* (F. Muell. ex Benth.) Tiegh.

Bleeser 421. Duplicate of a syntype of *Osbeckia koolpinyahensis* O. Schwarz (determined at Sydney as *O. australiana* Naud.).

Bleeser 495. Duplicate of the type number of *Phyllanthus xerocarpa* O. Schwarz

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* Division of Plant Industry, C.S.I.R.O.

Duplicates of the following numbers cited by Schwarz (1927) as species new to Australia are also held in the National Herbarium, Sydney:

Bleeser 217. *Calophyllum sil* Lauterb.

Bleeser 476. *Calophyllum kiong* Lauterb. et Schum.

All the Bleeser specimens held in Sydney are dated 4/1927, which presumably is the date of incorporation into the Herbarium rather than that of collection.

Little appears to be known of Bleeser, who must have been a keen and competent collector. His only contact among Australian botanists seems to have been W. F. Blakely of the National Herbarium, Sydney. Blakely worked closely with D. W. Shiress, a Sydney executive, who was an active plant collector and visited Darwin regularly on business. It is probably due primarily to Shiress that some Bleeser material is available in Sydney. Blakely (1927) described *Eucalyptus bleeseri* W. F. Blakely, dedicating it to " Mr. F. A. K. Bleeser, Assistant Postmaster, Port Darwin, who for upwards of 38 years has taken a very keen interest in the flora and fauna of the Northern Territory ".

LITERATURE CITED

Blake, S. T. (1948).—Studies in Australian Apocynaceae and Asclepiadaceae I. Proc. Roy. Soc. Qld. LIX, 161.

Blake, S. T. (1954).—Botanical contributions of the Northern Australian regional survey. II. Studies on miscellaneous Northern Australian plants. Aust. Journ. Bot. II, 99.

Blakely, W. F. (1927).—Descriptions of nine new species of *Eucalyptus*. Journ. Proc. Roy. Soc. N.S.W. LXI, 149.

Royen, P. van (1957).—Revision of the Sapotaceae of the Malaysian region in a wider sense. VII. Planchonella. Blumea VIII, 235.

Schwarz, O. (1927).—Plantae novae vel minus cognitae Australiae tropicae. Fedde Repert. XXIV, 80.

Cytological and Taxonomic Notes on Zamiaceae

L. A. S. JOHNSON

SUMMARY

A haploid complement of 9 chromosomes is reported for *Lepidozamia peroffskyana* Regel, *L. hopei* Regel, *Macrozamia moorei* F. Muell., *M. secunda* C. Moore, *M. heteromera* C. Moore, *M. stenomera* L. Johnson, and *M. pauli-guilielmi* W. Hill et F. Muell. ssp. *flexuosa* (C. Moore) L. Johnson. The karyotypes of the *Macrozamia* species are generally similar so far as seen, but the karyotype in *Lepidozamia* is somewhat different.

Notes are given on distribution, variation and hybridism in various species of *Macrozamia* and *Bowenia.*

In previous publications (Johnson 1959, 1961) the taxonomy of the Australian members of the Zamiaceae has been treated in detail. This paper includes cytological observations and supplementary notes on distribution, hybridism and morphological features of some of the species.

CYTOLOGY

Previously reported chromosome numbers were listed for all genera of Cycadales except *Lepidozamia,* as well as for all cytologically known Australian species of *Macrozamia* and *Bowenia.* These counts were due chiefly to Sax and Beal (1934), but other authors (cited by Darlington and Wylie 1955) dealt with *Bowenia spectabilis* and with some of the extra-Australian species. In addition, Brough and Taylor (1940) provided a count on *Macrozamia communis* (under the misapplied name of " *M. spiralis* "); reports by Light (1924) and Baird (1939) are dealt with below. The name *Macrozamia tridentata* given by Sax and Beal is of uncertain application; the identity of their material is unknown.

Whereas in *Cycas* (Cycadaceae s. str.) the number $n = 11$ (and possibly $n = 12$) is found, the predominant number in Zamiaceae is $n = 9$, reported in *Encephalartos*, *Macrozamia*, *Dioon*, *Bowenia* and *Zamia.* The last-named genus also includes species with $n = 8$, a number which is reported also for *Ceratozamia. Microcycas* is outstanding with $n = 13$; confirmation of this number is desirable. *Stangeria* (Stangeriaceae) has $n = 8$. No polyploids are known.

Light (1924), studying mitosis in the female gametophyte of *Macrozamia riedlei* (" *M. fraseri* "), reported a haploid number of 12. However, one of the clearest of his figures (fig. 22) can be readily interpreted as showing 9 chromosomes and others, though less clear, suggest that the number is less than 12. This is particularly the case if allowance is made for a number of metacentric chromosomes. Baird (1939), describing microsporogenesis in the same species, noted the arrangement of the chromosomes in 8 or 9 " groups " at meiosis but attributed this to secondary association and accepted Light's count of $n = 12$. However, her photograph of first metaphase (Baird 1939, Pl. II, fig. 17) shows 9 bivalents fairly clearly. A figure of anaphase of second division (fig. 18) is less definite but is not inconsistent with a complement of 9 chromosomes of the form found in the present study in other species of *Macrozamia.* More recently, Miss Baird (personal communication) has found $n = 9$ in *M. riedlei.*

In the present study attention was given chiefly to *Lepidozamia* and species of *Macrozamia* section *Parazamia*, since these groups were cytologically unknown. Meiotic counts were made from microsporogenesis which is readily obtained in male cones. First pollen grain meiosis was used in the count on *Macrozamia secunda*. Other mitotic counts were made on root tips of young plants. Aceto-orcein squash preparations were used in all cases, root-tip material being given pre-fixation treatment of 2¼ hours in saturated aqueous solution of *p*-dichlorobenzene.

The results are given in Table I. All localities are in New South Wales, but *Lepidozamia hopei* and *Zamia floridana* are natives of North Queensland and Florida respectively.

Table I

New Chromosome Numbers in Zamiaceae

Genus and Species	*n*	2*n*	Locality	Voucher Specimen Herb. NSW No.
LEPIDOZAMIA				
L. peroffskyana Regel	9	..	Botanic Gardens, Sydney	59842
L. hopei Regel	..	18	Botanic Gardens, Sydney	61268
MACROZAMIA				
Sect. *Macrozamia*				
M. moorei F. Muell.	9*	..	Dalmorton	61236
Sect. *Parazamia*				
M. secunda C. Moore	9	..	Capertee	59807
M. heteromera C. Moore	..	18	Botanic Gardens, ex Pilliga Scrub.	56594
M. stenomera L. Johnson	..	18	Botanic Gardens, ex Nandewar Range.	56960
M. pauli-guilielmi W. Hill & F. Muell. ssp. *flexuosa* (C. Moore) L. Johnson.	..	18	Botanic Gardens, prob. ex Newcastle district.	56961
ZAMIA				
Z. floridana A.DC.	..	16	Botanic Gardens, Sydney	57786

* Count by B. G. Briggs.

The number $n = 9$ is thus found to occur in *Lepidozamia* as in the majority of the Zamiaceae, and this number is found also in both sections of *Macrozamia*. The chromosomes are large in all cases (fig. 1 and Plate VII). Detailed analysis of the karyotype was not made but all centromere positions could be determined in *Lepidozamia hopei*, *Macrozamia moorei*, *M. secunda* and *M. pauli-guilielmi*.

The karyotypes of the *Macrozamia* species are generally similar; the haploid complement includes four large chromosomes with median or submedian centromeres. The remaining chromosomes are somewhat smaller with the arms unequal to varying degrees. *Lepidozamia hopei* shows a somewhat different distribution of chromosome lengths and also a satellite, which was not distinguished in the *Macrozamia* species

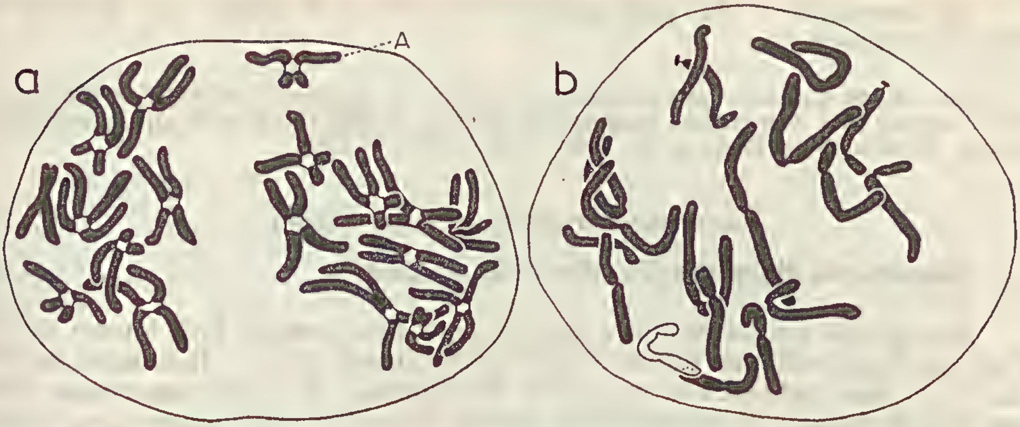


Fig. 1.—a. *Macrozamia secunda*. $n = 9$. Meiosis, metaphase II. (The chromosome at A belongs to the left-hand group.) × 900. b. *Lepidozamia hopei*. $2n = 18$. Mitosis, metaphase × 1100.

examined. There is no evidence as to presence or absence of the satellite in *L. peroffskyana*, which was studied at meiotic stages in which morphological details were not clearly apparent. Since *Macrozamia* and *Lepidozamia* appear to have had long independent histories (Johnson 1959), identical karyotypes would not be expected in the two genera. Karyotype differences exist between other genera (Sax and Beal 1934).

A count on *Zamia floridana* confirms the number $2n = 16$ for this species. In view of the occurrence of both $n = 8$ and $n = 9$ in *Zamia*, a cytotaxonomic study of this genus would be worthwhile.

TAXONOMIC NOTES

Hybrid swarms involving Macrozamia communis.

It was previously stated (Johnson 1959) that, although *M. communis* occurred in places near stands of certain species of section *Parazamia*, hybrids were not yet known. Subsequently apparent hybrid swarms between *M. communis* and two species of section *Parazamia* have been found in several localities. In these cases communities of the parent species overlap and plants intermediate in varying degrees occur mixed with them. Sometimes, as at the Dudley locality, one parent and apparent hybrids are common and the other parent is rare in the pure form. Detailed studies of these swarms have not been made and it would be premature to suggest their age or histories. Due to the long life-cycle of the plants, the infrequency of cones on many individuals, and the complete outcrossing, detailed genetical analysis would be difficult and time-consuming. Cone material has not been available to enable the degree of fertility of hybrid plants to be determined.

Representative specimens from these probable hybrid communities, all from New South Wales localities, are listed below. I have seen only the Dudley swarm.

M. communis *L. Johnson* × **M. secunda** *C. Moore.*

Central-western Slopes: Munghorn Gap, Mudgee to Wollar, R. Todd 1.1962 (NSW 60633).

M. communis × **M. pauli-guilielmi** *W. Hill et F. Muell.* ssp. **flexuosa** (*C. Moore*) *L. Johnson.*

North Coast (extreme southern part): Kahibah, W. Morris 10.1959 (NSW 47612); hill between Dudley and Merewether beaches, W. Morris 10.1959 (NSW 47613); 10 miles from Cessnock, 1½ miles from Ellalong, E. Todd 7.1960 (NSW 51355).

Supplementary notes on some species.

Macrozamia diplomera (*F. Muell.*) *L. Johnson.*

Several new collections have been made of this formerly little known species, but all are from localities within its previously known range. It is more variable in leaf-form than indicated in my earlier descriptions; in some populations many plants may be found with almost all the pinnae undivided, while others show varying degrees of division, some having most of the lower and middle pinnae twice-divided. No other differences are discernible and there is no indication of hybridism with other species. The pinnae are amphistomatic in all cases and this serves to distinguish the plants from *M. communis,* which they greatly resemble in general habit.

Cones of both sexes of *M. diplomera* are now known. They are generally similar to those of *M. communis* but smaller and with shorter spines. A female cone from Bugaldi had the following dimensions: length 30 cm., diam. 12 cm., sporophyll ends to 8 cm. broad and 4 cm. high, glaucous; spines from 0·2 to 3·5 cm. long, to 6-7 mm. broad at the base. A male cone (NSW 49019) is 30 cm. long, 6 cm. diam., with spines 0·1-2·5 cm. long.

New Collections: New South Wales: *North-western Slopes:* 4 miles S of Bugaldi, towards Yearinan, L. A. S. Johnson 2.4.1961 (NSW 53843, 53844, 53845, 53846); 11 miles N of Coonabarabran on Baradine road, G. W. Althofer 7.1960 (NSW 51729); Coonabarabran-Baradine road 7-15 miles from Coonabarabran, B. M. Borger 5.1960 (NSW 51814); 3 miles W of Premer, W. Morris 1.1960 (NSW 49019, 49020, 49021, 49022).

M. lucida *L. Johnson.*

New Collections: Queensland: *Moreton District:* Mt. Glorious, 20 miles NNW of Brisbane, W. Morris 5.1959 (NSW 49857). New South Wales: *North Coast:* 3 miles E of Dalmorton, W. Morris 1.1960 (NSW 49023).

Despite search, adult plants of *M. lucida* have still not been found at the Dalmorton locality; 49023 is semi-juvenile. *M. moorei* covers a large area of the steep hillsides here.

M. secunda *C. Moore.*

New Collections: New South Wales: *Central-western Slopes;* Half-way, Hannah's Bridge to Uarbry, L. A. S. Johnson 4.1961 (NSW 53847). *Central Tablelands:* 8 miles E of Capertee on Glen Davis road, E. F. Constable 11.1961 (NSW 59807, chromosome count voucher).

M. heteromera *C. Moore.*

It now appears that many stands of this species consist largely or entirely of plants with undivided pinnae. Mr. W. Morris (personal communication) states that this is the case at the Coonabarabran end of the Newell Highway, also at 19 miles from Coonabarabran on the Gunnedah road (represented by NSW 47164 cited by Johnson 1959) and at Rocky Glen at the Purlewaugh turn-off. These plants are all amphistomatic and this character may be used to distinguish the species from other members of Section *Parazamia*. Thus *M. diplomera* and *M. heteromera*, members of different sections, show extraordinary parallelism in variability, in division of pinnae and in distribution of stomata.

New Collections: New South Wales: *North-west Slopes:* Pilliga Scrub, 11 miles S of Narrabri, B. M. Borger 11.1959 (NSW 48454); half-way, Narrabri to Coonabarabran, W. Morris 1.1960 (NSW 49025); 12 miles NE of Coonabarabran on Narrabri road, G. W. Althofer 7.1960 (NSW 51728); Dandry road 2-3 miles N of Coonabarabran, H. Salasoo No. 2383a, 2383b, 9.1.1962 (NSW 60781, 60782); Warrumbungle Range, ¾ mile SW of Pincham Camp, Spirey Creek, B. G. Briggs 3.1961 (NSW 54000); Timor Road, W. Morris 5.1959 (NSW 47165).

Of the above, 51728, 60781, and 60782 have all pinnae entire; in the remainder many pinnae are once- or twice-divided.

M. stenomera *L. Johnson.*

Cones of this species are now known, they do not differ from those of *M. heteromera.*

New Collections: New South Wales: *Northern Tablelands:* Coryah Gap, Nandewar Range, B. G. Briggs 4.1961 (NSW 53999, 54117); Nandewar Ranges, B. M. Borger 11.1959 (NSW 48453).

Seedlings of this species show finely divided fronds from the earliest stages, whereas the *M. heteromera* seedlings seen have the pinnae undivided or once divided.

M. pauli-guilielmi *W. Hill et F. Muell.* ssp. **flexuosa** (*C. Moore*) *L. Johnson.*

New Collections: New South Wales: *North Coast* (*extreme southern portion*): Hill between Merewether and Dudley beaches, W. Morris 10.1959 (NSW 47617); Warner's Bay, W. Morris 10.1959 (NSW 47615, 47616); 10 miles from Cessnock, 1½ miles from Ellalong, E. Todd 6.1960 (NSW 51353, 51354).

In addition to these localities, Mr. E. Todd (personal communication) reports the subspecies from the following: Neath Hill (near Cessnock); Pelaw Main (near Kurri Kurri); between Belmont and Valentine; Sawyer's Gully (Cessnock-Maitland district).

M. fawcettii *C. Moore.*

New Collections: New South Wales: *North Coast:* Ewingar, per District Agronomist, Kyogle 11.1958 (NSW 46187); ca. 15 miles S of Tabulam, D. Blaxell 11.1958 (NSW 46188); Doubleduke State Forest, SW of Woodburn, R. A. Oxenford 12.1961 (NSW 59928); 26 miles from Grafton [apparently on Glen Innes road], B. M. Borger 5.1960 (51777); Woolgoolga, D. Blaxell 8.1959 (NSW 48559).

Bowenia.

In the description and discussion of this genus in the revision of the family (Johnson 1959) the term "decompound" was wrongly used in describing the division of the fronds. The latter are in fact *twice-compound*, never more, and this term should be substituted.

B. spectabilis *Hook. ex Hook. f.*

Brass (1953) records a *Bowenia*, which is probably this species (though I have not seen the collection), from Leo Creek, McIlwraith Range, which is north-east of Coen on the Cape York Peninsula, North Queensland. This represents an extension of the range indicated by Johnson (1959).

B. serrulata (*W. Bull*) *Chamberlain.*

New Collection: Queensland: *Cook District:* Downfall Creek road, Tinaroo Dam, Atherton Tableland, L. A. S. Johnson 5.1962 (NSW 61072).

This occurrence was pointed out to me by Dr. L. J. Webb, who does not know of it elsewhere in North Queensland. Unlike those at Byfield in the Rockhampton district, these plants are growing in rainforest (" notophyll vine forest "), on granodiorite at about 700 metres altitude. They are quite typical *B. serrulata. B. spectabilis,* though widespread in north-eastern Queensland rainforests, is not present at this locality. The two species of *Bowenia* are thus not widely separated geographically as previously thought.

ACKNOWLEDGMENTS

I wish to thank Dr. Barbara Briggs for her helpful advice in the cytological investigation, for assistance in the preparation of the figures, and for permission to cite her unpublished chromosome count on *Macrozamia moorei.* Mr. W. Morris, of Warner's Bay, Mr. E. Todd, of Toronto, and Mr. B. M. Borger, of Port Macquarie, have provided much useful information on the occurrence of species and hybrids in the field. Mr. E. F. Constable assisted by collecting cones of several species for study.

LITERATURE CITED

Baird, A. M., 1939.—A contribution to the life history of *Macrozamia reidlei.* Journ. Roy. Soc. W. Austral. XXV, 153-175.

Brass, L. J., 1953.—Results of the Archbold Expeditions No. 68. Summary of the 1948 Cape York (Australia) Expedition. Bull. Amer. Mus. Nat. Hist. CII, 141-205.

Brough, P. and Taylor, M. H., 1940.—An investigation of the life cycle of *Macrozamia spiralis* Miq. Proc. Linn. Soc. N.S.Wales LXV, 494-524.

Darlington, C. D. and Wylie, A. P., 1955.—Chromosome Atlas of Flowering Plants. London.

Johnson, L. A. S., 1959.—The families of cycads and the Zamiaceae of Australia Proc. Linn. Soc. N.S.Wales LXXXIV, 64-117.

Johnson, L. A. S., 1961.—Zamiaceae. Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 1, 21-41.

Light, K. E., 1924.—The ovule and development of the female gametophyte of *Macrozamia Fraseri.* Ann. Bot. XXXVIII, 337-349.

Sax, K. and Beal, J. M., 1934.—Chromosomes of the Cycadales, J. Arnold Arboretum XV, 225-258.

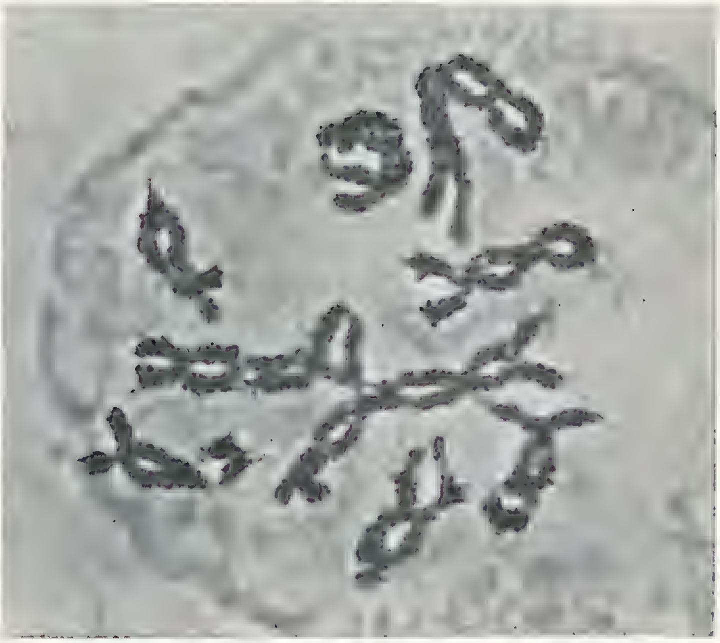


Fig. 1.—*Lepidozamia peroffskyana.* $n=9$. Diakinesis.

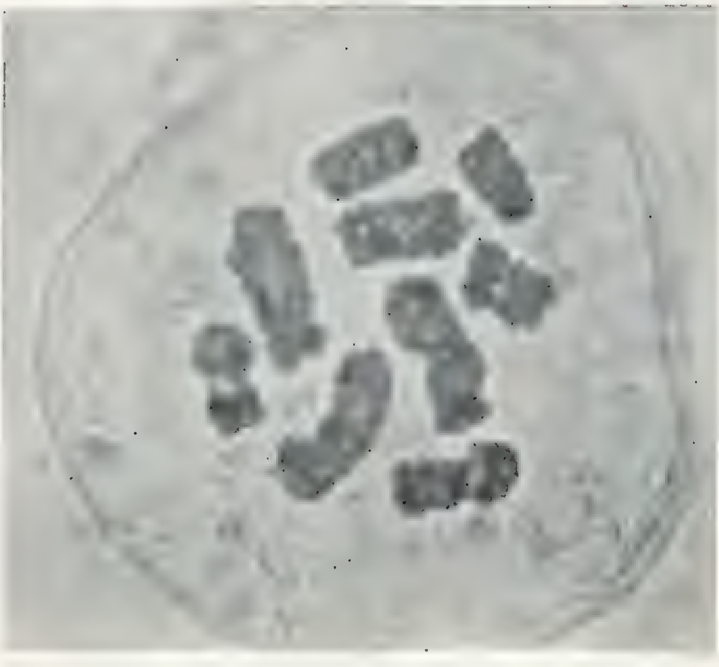


Fig. 2.—*Macrozamia secunda.* $n = 9$. Metaphase I.
× 1350.

New Species of *Juncus* in Australia and New Zealand

L. A. S. Johnson

Summary

Juncus usitatus, *J. sarophorus* and *J. gregiflorus* are described as new. All are members of Section *Juncus* and all occur in both Australia and New Zealand. *J. usitatus* is also found in New Caledonia.

The Australian species of *Juncus*, especially those of Section *Juncus*, are under revision and a full treatment will be published in due course, including descriptions of a number of new species. Three such species, which occur in both Australia and New Zealand, are described here so that reference may be made to them in New Zealand work on the genus. I am indebted to Dr. Elizabeth Edgar of the Botany Division, Department of Scientific and Industrial Research, Christchurch, for New Zealand material and information generously given. English descriptions and detailed lists of localities will be published later.

Juncus usitatus *L. Johnson*, **sp. nov.**

Holotype: Cheltenham, New South Wales, L. A. S. Johnson 23.11.1952 (NSW 20734). Isotypes in K (distributed as "*J. polyanthemus* Buchen.") and CHR.

Herba perennis dense cæspitosa rhizomate horizontali vel adscendenti. Cataphylla (folia squamiformia ad basin culmorum) erecta, basi atrobrunnea vel castanea, plus minusve nitentia, sursum straminea, cataphyllum longissimum 4-18 cm. longum (vel raro aliquanto longius), 3-8 mm. latum, lamina nulla vel apiculum minutum formanti. Culmi erecti, plus minusve rigidi, teretes, virides, saepissime 35-100 (-120) cm. alti bractea culmiformi inclusa, 0·75-1·5 (-2·0) mm. diametro supra cataphylla, 25-40 striis (in sicco distincte elevatis) instructi, medulla interrupta vel aliquando partim (rare per totum) continua, stomatibus superficialibus. Bractea primaria culmiformis elongata, culmum continuans, secundaria plerumque 0·5-1·5 cm. longa aristam subulatam includens. Inflorescentia diffusa vel aliquanto condensata sed nunquam glomeriformis, nonnullis ramorum saepe plus minusve recurvatis, floribus saepissime 1·5-5 mm. distantibus. Tepala acuta, primum viridia deinde straminea marginibus membraneis, rigidiuscula vel sublaxa, exteriora plerumque 1·3-2·0 mm. longa, capsula breviora. Stamina plerumque 3 (rarissime usque ad 6), antheris 0·35-0·45 (-0·5) mm. longis, filamentis circiter 0·5 mm. longis. Capsula pallida, ellipsoidea, circiter 2·0 mm. longa, apice obtusa vel minutissime apiculata, seminibus pallide castaneis, oblique ellipsoideis, leviter striatis, utrinque minute apiculatis.

J. usitatus is known from eastern Queensland as far north as the Atherton Tableland, the Coast, Tablelands, Western Slopes and nearer Western Plains of New South Wales, a few localities in Victoria and South Australia, and also from New Caledonia and the northern part of the North Island of New Zealand. It has not been found in Tasmania or Western Australia. In the coast districts of southern Queensland and of New South Wales it is a very common species, whence the specific epithet. It is very frequently found on stream banks, but also occurs in other moist places.

The name *J. polyanthemus* Buchen. has been applied in Australia more or less indiscriminately to many species, but in particular to *J. usitatus*, especially in New South Wales and Queensland. Buchenau himself determined specimens of this species as forms of *J. polyanthemus*. However, the true *J. polyanthemus* is a much less common species with stouter, taller, somewhat glaucous culms and denser inflorescences with many more flowers. It is found only in eastern Queensland and in the coast districts of New South Wales north of Wyong, and until recently has been poorly represented in herbaria. *J. usitatus* and *J. polyanthemus* have been observed growing together and remaining quite distinct, nevertheless there are a few collections which suggest that they occasionally hybridise.

The description given applies to the widespread normal form of *J. usitatus*. Forms probably showing the effects of hybridism and introgression involving other species will be dealt with in a later publication.

Juncus sarophorus *L. Johnson*, **sp. nov.**

HOLOTYPE: Dalyston, 5 miles west of Wonthaggi, Victoria, L. A. S. Johnson 2.4.1959 (NSW 49844). ISOTYPE in CHR, and to be sent to K, MEL, AD.

Herba perennis dense caespitosa rhizomate horizontali vel adscendenti. Cataphylla erecta, basi atropurpurea vel brunnea, plus minusve nitentia, sursum castanea, deinde straminea, cataphyllum longissimum 7-40 cm. longum, 4-11 mm. latum, lamina nulla vel apiculum minutum formanti. Culmi erecti, rigidi, teretes, virides, saepissime 70-120 (-180) cm. alti bractea culmiformi inclusa, 1·5-3·0 (-4·0) mm. diametro supra cataphylla, (25-) 30-50 striis distincte elevatis instructi, medulla interrupta vel rare partim continua, stomatibus in foveis minime profundis lateribus obliquis dispositi nunquam superficialibus. Bractea primaria culmiformis elongata, culmum continuans, secundaria plerumque 1-2 cm. longa aristam subulatam includens. Inflorescentia plerumque moderate densa sed non glomeriformis, plus minusve scopis similis, aliquanto variabilis sed saepissime ramis aggregatis erectis nec diffusis, floribus crebris sed non agglomeratis. Tepala acuta, primum viridia deinde straminea marginibus membraneis, rigidiuscula, exteriora plerumque 2·0-2·5 mm. longa rare aliquanto breviora longiorave, capsulam paululum excedentia, Stamina plerumque 3 (rarissime usque ad 6?), antheris 0·4-0·6 mm. longis, filamentis circiter 0·5 mm. longis. Capsula pallida, ellipsoidea apice obtusa vel minutissime apiculata, seminibus eis *J. usitati* similibus.

This species occurs on the Northern, Central and Southern Tablelands and far South Coast of New South Wales, in eastern and southern Victoria, in Tasmania, in south-eastern and southern South Australia, and in New Zealand. In New Zealand the name *J. luxurians* has been misapplied to it, but the type of *J. luxurians* Colenso belongs to *J. effusus* L. (E. Edgar, personal communication). *J. effusus*, an introduction from the Northern Hemisphere, is widespread in New Zealand but does not occur in Australia, although it is apparently indigenous in the highlands of New Guinea.

J. sarophorus has been confused in the past with *J. usitatus* under the misapplied name of *J. polyanthemus* Buchen., and material formerly determined by myself as "*J. polyanthemus* southern race" or as "*J.* sp. nov. Y" belongs here. Its natural area overlaps the range of *J. usitatus* in Eastern Australia by some hundreds of miles without significant intergradation, though one or two possible hybrid specimens are known. It differs from *J. usitatus* in the longer, more acute tepals which exceed or at least equal the capsule, in the usually more erect and tufted branching of the inflorescence, and particularly in the position of the stomata of the culm, each of which is sunken in a shallow sloping-sided depression in the epidermis. The sunken stomata can be clearly seen in transverse sections of the culms, by means of which the identity of imperfect specimens may be settled. The only other Australasian members of Section *Juncus* with sunken stomata are *J. australis* Hook. f. and two undescribed species (my species " K " and " Q "), in all of which the depressions are deep and vertical-sided. One or two probably hybrid specimens of *J. australis* and *J. sarophorus* are known, but in general these species seem to inhabit the same areas, though not precisely the same habitats, with little intergradation. The *J. polyanthemus* complex includes a number of taxa differing in characters of the culms, inflorescence and flowers. Unlike *J. sarophorus*, some of these appear to intergrade with each other in certain areas, and they all have superficial stomata.

The specific epithet is from the Greek, " broom-bearing ", and refers to the broom- or brush-like inflorescences.

Juncus gregiflorus *L. Johnson*, **sp. nov.**

HOLOTYPE: Mongarlowe River at Northangera, New South Wales, B. G. Briggs 24.12.1961 (NSW 56850), ISOTYPE in CHR.

Herba perennis dense caespitosa rhizomate horizontali vel adscendenti Cataphylla erecta, plus minusve laxe voluta, basi atrobrunnea vel castanea, nitentia, sursum straminea, cataphyllum longissimum 5-27 cm. longum, 6-17 mm. latum, lamina nulla vel apiculum minutum formanti. Culmi erecti, rigidi, teretes, virides, saepissime 40-140 cm. alti bractea culmiformi inclusa, 1-4 mm. diametro supra cataphylla, striis (25-) 30-80 (-100) (in sicco distincte elevatis) instructi, medulla interrupta, stomatibus superficialibus. Bractea primaria culmiformis elongata, culmum continuans, secundaria 0·4-1·5 cm. longa aristam subulatam includens. Inflorescentia aliquanto variabilis sed semper densa, ramis plerumque brevibus, floribus aggregatis frequenter glomerulos formantibus. Tepala acuta, rigida, tandem straminea marginibus angustis membraneis, longitudine variabilia, exteriora 1·7-3·0 mm. longa, capsulam plerumque aequans vel subaequans. Stamina 3, antheris 0·4-0·7 mm. longis, filamentis circiter 0·5 mm. longis. Capsula plus minusve castanea vel aliquando pallida, ellipsoidea, plerumque 1·8-2·5 mm. longa, apice obtusa sed minute apiculata, seminibus eis *J. usitati* similibus.

J. gregiflorus is found from the North Coast and Northern Tablelands of New South Wales to Victoria, Tasmania and the wetter parts of South Australia, and also in the south-west of Western Australia and in New Zealand. It is most common in the southern parts of its range. The species is variable in stature and thickness of the culms and in the degree of condensation of the inflorescence, but is distinct from all other species. The specific epithet refers to the clustered flowers.

In the past, specimens of *J. gregiflorus* have been referred to various species of the Section *Juncus*, but independently of the present study it has been recognised as a distinct species in New Zealand by Dr. Elizabeth Edgar (personal communication). Superficially, specimens of *J. gregiflorus* often greatly resemble those of *J. australis* Hook. f., and Hooker himself included plants of both species in his concept of *J. australis*. However, the two species are strikingly distinct anatomically and no intermediates are known. *J. australis*, which occurs in New South Wales (chiefly Tablelands), Victoria, South Australia, Tasmania, and New Zealand, has the stomata deeply sunken in epidermal depressions, while in *J. gregiflorus* the stomata are quite superficial as in *J. usitatus*. Specimens of the two species may be distinguished by running the point of a fine needle longitudinally along the grooves of a culm; *J. gregiflorus* is quite smooth and the needle passes almost silently, but *J. australis* is rough to the needle and a distinct scraping sound may be heard. This test is quite reliable, with experience, but otherwise for certain identification the stomates should be examined microscopically in a transverse section of a culm.

J. gregiflorus may usually be distinguished anatomically from *J. usitatus* by the more radially elongated sclerenchyma patches. A few specimens from the South Coast of New South Wales may represent hybrids between *J. gregiflorus* and *J. usitatus*, but in general the two species are quite distinct. The more clustered inflorescence, the greater length of the tepals in relation to the capsule, the usually looser cataphylls (" scale-leaves "), and the frequently darker capsules also serve to distinguish *J. gregiflorus* from *J. usitatus*.

Studies in Australian Pteridophytes. No. 4

MARY D. TINDALE

Due to the forthcoming publication of the " Handbook to the Flora of the Sydney District and Blue Mountains " and further parts of the " Pteridophyta of South Eastern Australia " in Contrib. N.S.W. Nat. Herb., Flora Series, it has been necessary to publish the following new species and emendations. In addition a number of African and American species have been transferred to the genus *Lastreopsis*.

Lastreopsis *Ching*

The following combinations have been made in *Lastreopsis* prior to my forthcoming monograph on this genus:—

Lastreopsis acuta (*Hook.*) *Tindale* **comb. nov.** (BASIONYM *Nephrodium acutum* Hook., Sp. Fil. IV (1862) 147, pt. (excl. tab. 271)). DISTRIBUTION: South America (Brazil).

Lastreopsis exculta (*Mett.*) *Tindale* ssp. **guatemalensis** (*Bak.*) *Tindale* **comb. et stat. nov.** (BASIONYM *Nephrodium guatemalense* Bak. in Hook. et Bak., Syn. Fil., ed. 2 (1874) 498). DISTRIBUTION: Central and South America (Mexico, Guatemala, Costa Rica, Panama, Colombia and Ecuador).

Lastreopsis exculta (*Mett.*) *Tindale* ssp. **squamifera** (*C. Chr.*) *Tindale* **comb. et stat. nov.** (BASIONYM *Dryopteris exculta* (Mett.) C. Chr. var. *squamifera* C. Chr., Monogr. *Dryopteris* II (1919) 1920, 96). DISTRIBUTION: Costa Rica and Mexico.

Lastreopsis nigritiana (*Bak.*) *Tindale* **comb. nov.** (BASIONYM *Polypodium nigritianum* Bak., Syn. Fil. (1867) 313). EQUIVALENT SYNONYM: *Ctenitis pubigera* Alston in Bol. Soc. Brot. XXX, 2a sér. (1956) 12; Ferns & Fern-Allies West Trop. Africa (1959) 73. DISTRIBUTION: Africa (Nigeria, Cameroon and Fernando Po).

Lastreopsis subsimilis (*Hook.*) *Tindale* **comb. nov.** (BASIONYM *Gymnogramme subsimilis* Hook., Sp. Fil. V (1864) 142). ABSOLUTE SYNONYM: *Ctenitis subsimilis* (Hook.) Tard. in Not. Syst. XIV (1952) 342; in Mém. I.F.A.N. XXVIII (1953) 137, t. 24, f. 1 and 2. DISTRIBUTION: Africa (Ivory Coast, Dahomey, Malagasy Republic, Gabon, Nigeria, Cameroon and Fernando Po).

Lastreopsis vogelii (*Hook.*) *Tindale* **comb. nov.** (BASIONYM *Polypodium vogelii* Hook., Sp. Fil. IV (1862) 271). EQUIVALENT SYNONYMS: *Dryopteris subcoriacea* C. Chr., Ind. Fil. (1905) 295. *Ctenitis subcoriacea* (C. Chr.) Alston in Bol. Soc. Brot. XXX, 2a. sér. (1956) 12. DISTRIBUTION: Africa (Nigeria, Cameroon and Fernando Po).

Adiantum silvaticum *Tindale* **sp. nov.**

A. cunninghamii Hook. affine, paleis rhizomatis flavo-brunneis, denticulatioribus, laminis vix glaucis et sporis minoribus, 31.88-41·25 μ x 30-37·5 μ differt.

Related to *A. cunninghamii* Hook., but the scales of rhizome yellow-brown, more denticulate, the laminas scarcely glaucous and the spores smaller, 31.88 to 41·25 μ x 30 to 37·5 μ.

HOLOTYPE: Whian Whian State Forest, WNW of Byron Bay, 2,000 ft. alt., frequent in rocky gully, Constable 1.1953 (NSW P7017).

DISTRIBUTION: Australia (Queensland, also the Coast and Tablelands of New South Wales).

REPRESENTATIVE SPECIMENS: QUEENSLAND: Lamington National Park, Elabana Falls track, alt. 2,900 ft., in rainforest, terrestrial fern, Smith & Tindale 8.1956 (NSW P7460). NEW SOUTH WALES: Dorrigo State Forest, Davis 10.1955 (NSW P7462); Orara East State Forest, Coff's Harbour, erect fern 12-24 inches high, frequent in deep rainforest near creek, 250 ft. alt., Constable 5.1956 (NSW P8070); Newry State Forest, in poor rainforest in gully near small creek, Floyd & Tindale 8.1961 (NSW P8272); Bulgong Heights, Watts 5.1916 (NSW P1740); Port Macquarie, Boorman 6.1915 (NSW P2528); Dyer's Crossing, Gilbert 8.1948 (NSW P4808); O'Sullivan's Gap, Gilbert 7.1948 (NSW P4811); Upper William's River, Fraser & Vickery 11.1936 (NSW P2541); Brittania Falls, Valley of the Waters, in rainforest, sandstone country, alt. 1,650 ft., Constable 2.1949 (NSW P5655).

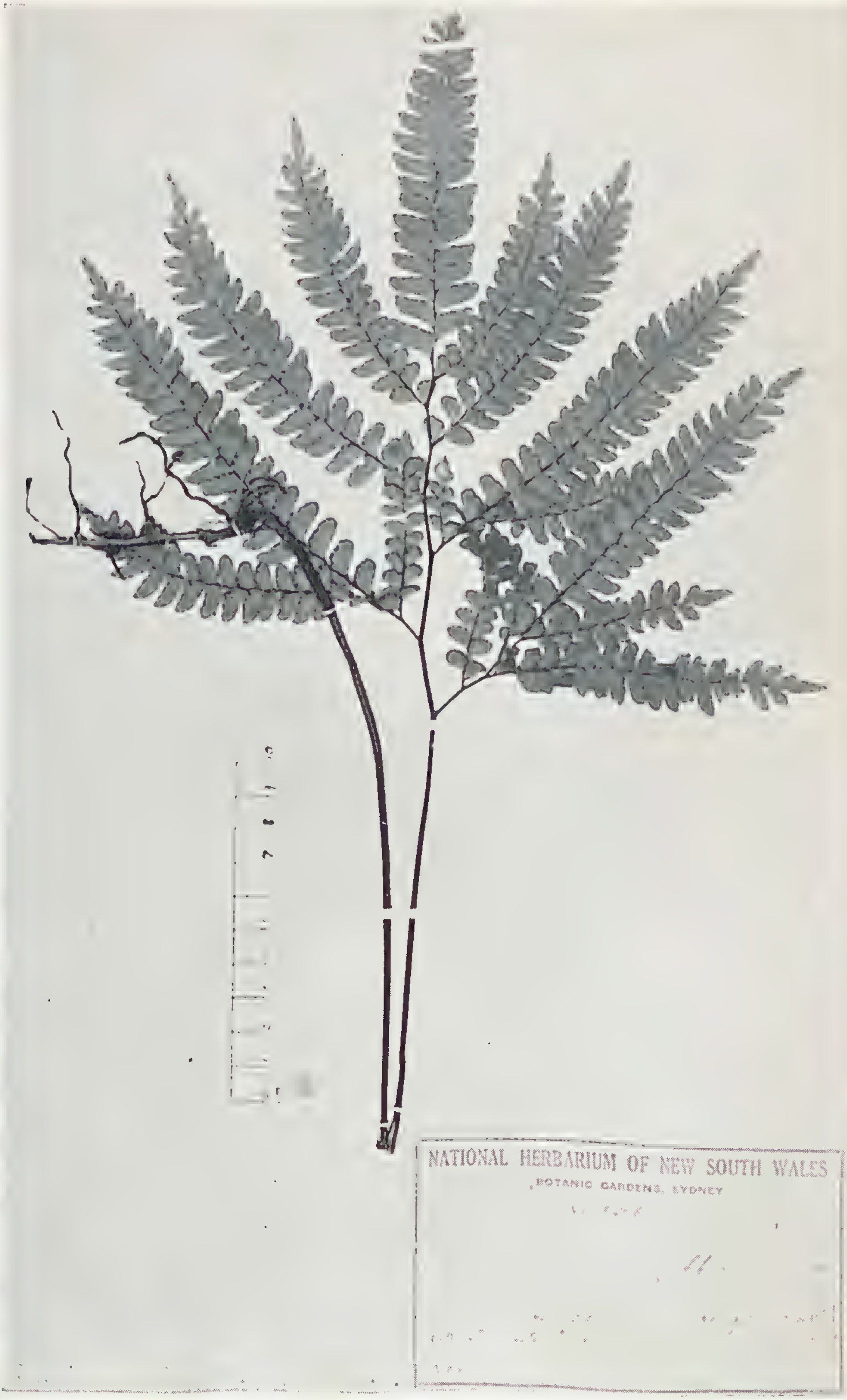
After studying plants of *Adiantum cunninghamii* Hook. in the field in New Zealand as well as examining further material kindly lent by the D.S.I.R., Christchurch, New Zealand, I have concluded that this taxon is specifically distinct from *A. silvaticum*, this being contrary to my earlier published remarks in Amer. Fern Journ. L (1960) 119. *A. cunninghamii* is found in New Zealand as well as in Queensland (e.g. NSW P2636 collected at Rockingham's Bay by Dallachy), whereas *A. silvaticum* occurs in the rainforests of Queensland and New South Wales as far south as the Blue Mountains. In *A. cunninghamii* the older scales of the rhizome are dark red-brown instead of golden-brown, although the young scales at the tip of the rhizome are sometimes golden-brown in this species e.g. D.S.I.R. No. 58610 collected at Karamea River, Nelson, New Zealand, by R. Mason in December 1947. The laminas of *A. cunninghamii* are much more glaucous and are usually smaller than in *A. silvaticum* being about 8·5 to 28 cm. long and 6 to 26 cm. broad, whereas they are about 20 to 30 cm. long and about 15 to 30 cm. broad in the latter species. The scales of the rhizome in *A. cunninghamii* are less denticulate than in *A. silvaticum* and are often quite entire. In both species the spores are tetrahedral, trilete and smooth but in *A. silvaticum* they are smaller being 31.88 to 41·25μ x 30 to 37·5μ, whereas in *A. cunninghamii* they are 37·5 to 60μ x 33·75 to 56·25μ.

Some typical specimens of the latter species from New Zealand are as follows:—South Karori Rd., Hay 2.1950 (D.S.I.R. No. 72630); Little Barrier Island, Morrison 1.1956 (D.S.I.R. No. 91677); Eastbourne, Wellington, Rawson 3.1948 (D.S.I.R. No. 62551); Long Bay, South Auckland, Allan 1.1932 (D.S.I.R. No. 4328) and Moko Hinau Island, Gillham 8.1957 (D.S.I.R. No. 111610).

All the specimens of *A. silvaticum* cited earlier in this paper are characterized by a dense vestiture of small, dark, curved hairs on the upper surface of the main rhachis but there is another less common form of this species in which the upper surface of the main rhachis is quite glabrous. Specimens such as NSW P6219 from Mt. Lindsay, NSW P7448 from Elabana Falls and NSW P7712 from Mt. Boss State Forest appear to be morphologically identical with the commoner form of

Plate VIII

Photo by courtesy of the Government Printer of New South Wales



Adiantum silvaticum Tindale:—A specimen collected by L. Gilbert at O'Sullivan's Gap, N.S.W., in July, 1948 (NSW P4811).

this species except that the upper surface of the main rhachis is quite glabrous but I have seen no intermediates between these two forms. The material from north-eastern Queensland needs further collecting with rhizomes and a thorough investigation.

A chromosome count of $n = 58$ was recorded for *A. cunninghamii* (as *A. affine*) in Trans. Roy. Soc. N.Z., Bot. I (1961) 2, by Brownlie, on material collected at Ashley Gorge, New Zealand. So far no chromosome count has been published for *A. silvaticum.*

Blechnum wattsii *Tindale* **sp. nov.**

Filix robusta, erecta, usque ad 1·3 m. alta. Rhizoma repens, 5-10 mm. crassum, paleis acuminatis, coriaceis, integris vel sparsissime denticulatis, saepe nitidis, bicoloribus, centro atrobrunneis vel brunneis et marginem versus castaneis, 0·5-1 cm. longis, 1-2 mm. latis, linearibus vel lanceolatis, basi cordatis, paleis juvenilibus saepe castaneis dense vestitum. Stipes erectus, usque ad 60 cm. longus, 1-5 mm. crassus, fuscus vel pallide rufo-brunneus, basi atrobrunneus, superne profunde sulcatus, paleis basis stipitis ut in rhizomate. Rhachis fusca vel pallide rufo-brunnea, laevis vel aliquando tuberculata, paleis atrobrunneis, concoloribus, saepe nitidis, denticulatissimis, acuminatis, contortis, basi cordatis vestita. Frondes usque ad 1 m. longae, dimorphae, 1-pinnatae. Pinnae laterales steriles breviter petiolatae, coriaceae, 2-14-jugae, atrovirides, anguste oblongae, apice obtusae, late rotundatae vel abrupte acuminatae, basi truncatae vel subauriculatae, margine serrulatae, pinnae apicem versus dentibus pungentibus, pinnis inferioribus non reductis vel vix reductis. Costa paleis atrobrunneis, concoloribus, nitidis vel non nitidis, denticulatissimis basi cordatis vestita. Pinna sterilis terminalis lanceolata, basi inaequalis, 6-14 cm. longa, 1·5-3 cm. lata, apice acuminata. Venae prominentes, simplices vel furcatae, glabrae vel paleis substellatis, atrobrunneis vestitae. Pinnae fertiles lineares, subsessiles vel breviter pedicellatae, remotae, alternae vel oppositae, subtus ad costam sporangiis omnino obtectae, 4-18 cm. longae, 0·1-1 cm. latae, 4-18-jugae. Indusium papyraceum, brunneum, lineare, erosum vel integrum, 0·5-1 mm. diametro. Sori lineares. Sporae bilaterales, ellipticae vel subglobosae, perisporiis hyalinis, tenuibus, arcte reticulatis, cristis irregularibus, 45-63·75μ x 30-41μ, ala erosa, dissecta, circiter 3·75-9·38μ lata.

Robust, erect fern up to 1·3 m. high. *Rhizome* creeping, 5 to 10 mm. broad, densely clothed with scales which are acuminate, coriaceous, entire or very sparsely denticulate, often glossy, bicolorous, dark brown or brown in the centre and chestnut-coloured towards the margin, 0·5-1 cm. long, 1-2 mm. broad, linear or lanceolate, the base cordate, the young scales often chestnut-coloured. *Stipes* erect, up to 60 cm. long, 1-5 mm. broad, fuscous or light red-brown, dark brown at the base, deeply grooved above, the scales of the base of the stipe the same as on the rhizome. *Rhachis* fuscous or light red-brown, smooth or sometimes tuberculate, clothed with scales which are dark brown, concolorous, often glossy, very denticulate, acuminate, the base cordate. *Fronds* up to 1 m. long, dimorphic, 1-pinnate. *Sterile lateral pinnae* shortly petiolate, coriaceous, 2- to 14-jugate, dark green, narrowly oblong, with the apex obtuse, broadly rounded or abruptly acuminate, truncate or subauriculate at the base, the margin serrulate with the teeth pungent towards the apex of the pinna, the lower pinnae not or scarcely reduced. *Costa* clothed with dark brown, concolorous, glossy or dull, very denticulate scales which are cordate at the base. *Sterile terminal pinna* lanceolate, unequal at the base, 6-14 cm. long, 1·5-3 cm. broad, acuminate at the apex. *Veins* prominent, simple or forked, glabrous or clothed with substellate, dark brown scales. *Fertile pinnae* linear, subsessile or shortly pedicellate, widely spaced, alternate or opposite, the whole of the lower surface covered with sporangia up to the costa, 4-18 cm. long, 0·1-1 cm. broad, 4- to 18-jugate. *Indusium* papyraceous, brown, linear, erose or entire, 0·5-1 mm. in diameter. *Sori* linear. *Spores* bilateral, elliptical or subglobose, the perispore hyaline, thin, closely reticulate with irregular crests, 45-63·75μ x 30-41μ including the wing which is erose, dissected, about 3·75-9·38μ broad.

HOLOTYPE: Hazelbrook, Blue Mountains, N.S.W., Australia, stiffly erect plants growing along creek banks, in a rainforest gully, M. Tindale 4.1960 (NSW P8084), located in the National Herbarium of New South Wales, Sydney, Australia. ISOTYPES: K and US.

DISTRIBUTION: Eastern Australia.

ECOLOGICAL DISTRIBUTION: terrestrial in rainforests in colonies, growing in soil usually under trees and shrubs, never growing on rocks.

REPRESENTATIVE SPECIMENS: QUEENSLAND: Lamington National Park, Elabana Falls track, ca. 2,800 ft. alt., in rainforest, erect terrestrial fern, Smith & Tindale 8.1956 (NSW P7463). NEW SOUTH WALES: Mt. Lindsay, 3,750 ft. alt., plentiful on the southern side of the summit, basalt, Constable 11.1953 (NSW P6551); Mt. Boss State Forest, 35 miles NW of Wauchope, frequent to common on rainforest hillside, Constable 10.1956 (NSW P8057); Mt. Victoria, Watts 8.1914 (NSW P4379); Victoria Falls, in soil under trees, in rainforest gully near top of falls, sandstone, 1,200 ft. alt., Constable 5.1959 (NSW P8007); Neate's Glen, Blackheath, forming dense stands in soil beside track, sandstone, Tindale & Constable 3.1952 (NSW P6411); Govett's Leap, Blackheath, frequent in thick rainforest near bottom of path, Constable 3.1957 (NSW P8026); Sugar Loaf Mountain, Boorman 1.1915 (NSW P4380).

Previously in Proc. Linn. Soc. N.S.W. LXXXV (1960) 254, I had included this new species under *Blechnum procerum* (Forst. f.) Sw., to which it is very closely allied morphologically. However, *B. wattsii* differs from *B. procerum* (i.e. *B. minor* auctt. of New Zealand authors) by the bicolorous, slightly less denticulate scales on the rhachises and costae of the latter species e.g. Summit Road, Banks Peninsula, between Cass Peak and Cooper's Knob, S.I., New Zealand, Moore, Mason & Tindale 1.1962 (NSW P8337). The spores of *B. procerum* are larger being about 60 to 78·85μ x 39·38 to 67·6μ including a broad wing 11 to 17μ in width and surrounding the spore. The perispore of this species is much less reticulate than in *B. wattsii* and often there is only one anastomosis. A spore of *B. procerum* (as *B. minus*) is illustrated in Harris "A Manual of the Spores of New Zealand Pteridophyta" (1955) 43, pl. 8, f. 16.

It is not proposed to discuss the Tasmanian material of the *B. procerum* group, as this is under investigation by Mr. C. J. Quinn (see Papers & Proc. Roy. Soc. Tas. XC (1961) 1-5). The costal scales in the Tasmanian specimens are frequently bicolorous.

I have named *Blechnum wattsii* in honour of the Rev. W. W. Watts who was a pioneer in research work on the Australian ferns.

ACKNOWLEDGEMENTS

I wish to acknowledge with many thanks the facilities afforded by the Directors and Keepers of the following institutions: The D.S.I.R., Christchurch, New Zealand; the National Herbaria at Sydney and Melbourne; the Smithsonian Institution, Washington D.C., U.S.A., and the Botanic Museum and Herbarium, Brisbane. My thanks are also due to Miss L. Moore, Mr. C. V. Morton and Mr. L. S. Smith who kindly assisted me in various ways.

A Monograph of the Genus *Lastreopsis* Ching

MARY D. TINDALE

It has been my aim to bring together for the first time all or the majority of the species of *Lastreopsis* which have been scattered through other genera such as *Dryopteris, Ctenitis, Rumohra* and *Parapolystichum.* I would place *Lastreopsis* as a member of the Family Aspidiaceae in the restricted sense which I have defined in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 47.

HISTORY OF THE GENUS

R. C. Ching described *Lastreopsis* as a new genus in Bull. Fan Mem. Inst. Biol., Bot. Ser. VIII, 4 (11.9.1938) 157, with *L. recedens* (J. Sm. ex T. Moore) Ching (a synonym of *L. tenera* (R. Br.) Tindale) as the type species. He included three other species in his new genus viz. *L. parishii* (Hook.) Ching, *L. rufescens* (Bl.) Ching and *L. subrecedens* Ching. I do not consider that *L. parishii* belongs to *Lastreopsis,* since the structure of the rhachis is different. Instead I intend to place it in a monotypic genus related to *Hypodematium.* When he described *Lastreopsis,* Ching made no mention of the configuration of the upper surface of the main rhachis which is the chief diagnostic feature of this genus, separating it from its allies. The two prominent ridges on the main rhachis are continuous with those on the secondary rhachises which are in turn continuous with the thickened basiscopic margin of the laminal segments.

In his Monograph of the Genus *Dryopteris* II (1919), 1920, 93, Christensen referred three American species now known as *L. acuta* (Hook.) Tindale, *L. effusa* (Sw.) Tindale and *L. exculta* (Mett.) Tindale, to *Dryopteris* subgen. *Parapolystichum* (Keyserling) C. Chr. All three species are usually characterized by gemmiferous bulbils but the latter were later found to occur in several African species which I have transferred to *Lastreopsis* from *Ctenitis.* He also suggested that *Dryopteris wardii* (Bak.) C. Chr. and *D. hornei* (Bak.) C. Chr. might be referred to his new subgenus. Whereas *Lastreopsis hornei* (Bak.) Tindale is a typical member of this genus, the upper surface of the main rhachis in *D. wardii* is of the dryopteroid type.

In Sunyatsenia V (1940) 239, Ching raised *Parapolystichum* to generic rank but still retained *Lastreopsis* as a separate genus, referring *Dryopteris decomposita* (R. Br.) O. Ktze. to the former. However I cannot agree that two such closely related species as *L. tenera* and *L. decomposita* (R. Br.) Tindale should be placed in separate genera.

Copeland in Genera Filicum (1947) 123 took a very broad view of the genus *Ctenitis* including both *Parapolystichum* and *Lastreopsis* in it as well as *Ctenitopsis,* which is now included in *Tectaria,* and *Ctenitis boryanum* (Willd.) Copel. which is now placed in *Dryoathyrium.* He referred to *Rumohra,* l.c. 114, two species which I have included in *Lastreopsis,* viz. *L. hispida* (Sw.) Tindale and *L. amplissima* (Pr.) Tindale. Copeland made no reference to the structure of the main rhachis.

In Ferns of Malaya (1954) 498, Holttum cited the only Malayan species as being *L. parishii* but stated that " in non-Malayan species the edges of the leaflets (are) thickened and joined to a narrow rhachis-wing." He also said that *L. parishii* " differs from the other species of the genus as noted above, and should perhaps be included in *Ctenitis.* The other species appear to be distributed in South-east Asia and Australasia; they have not yet been distinguished and some are still under *Dryopteris* ". About this time Prof. Holttum suggested that I might revise these species but I later found that the genus was larger than expected and extended to America and West Tropical Africa.

In Vict. Nat. LXXIII (1957) 180-5, I published " A Preliminary Revision of the genus *Lastreopsis* Ching " with 25 new combinations and a redefinition of the generic characteristics. I included 3 American species, *L. pubescens*, *L. lurida* and *L. chaerophylloides* which I now agree with C. V. Morton in Amer. Fern Journ. L (1960) 154-5, should be placed in a small genus *Polystichopsis* (J. Sm.) Morton sens. strict.*, as the rhachis structure is dryopteroid instead of davallioid. However their affinities to *Lastreopsis* are close, as I indicated in Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961) 57, due to the quinquangular fronds, ruguloso-saccate spores and round sori which are either exindusiate or bearing orbicular-reniform indusia. As I mentioned in Vict. Nat. LXXIII (1957) 185, the glands on the lamina in *Polystichopsis* are not oblong as in the group of *L. decomposita* but are capitate and stalked. Scattered *Ctenitis*-hairs are found especially on the lower surface of the veins in *Polystichopsis*, these articulated hairs with dark red septa being characteristic of several genera including *Ctenitis* and *Lastreopsis*. In *Polystichopsis* the configuration of the upper surface of the rhachises is different from that of the above two genera, since it is of the dryopteroid type. The main rhachis of *Polystichopsis* has a median groove which is clothed with long, acicular hairs, e.g. *P. pubescens* (L.) Morton or *Ctenitis*-hairs e.g. *P. ochropteroides* (Bak.) Morton, but there is no central raised portion as in *Lastreopsis*. The median groove on the main rhachis of *Polystichopsis* spp. is open to admit the grooves of the secondary rhachises, also the raised edge of the groove of the secondary rhachises is joined to the side of the pinnule-costa groove, the edge of the pinnule being decurrent on the secondary rhachis as a lateral wing. Nevertheless the edge of the leaflet is slightly thickened as in *Lastreopsis*. The structure of the axes in the latter genus is of the davallioid type (see Plate XVI, f.1). There are 2 ridges on the upper surface of the main rhachis with a shallow channel between them, the latter being partly filled with a raised central portion which is usually densely hirsute (mostly with *Ctenitis*-hairs). The right-hand ridge on the main rhachis is continuous with the adjoining basiscopic ridge on the lowest secondary rhachis which is in turn continuous with that on the tertiary rhachis. Each ridge is ultimately continuous with that of the thickened, basiscopic margin of a leaflet.

In Vict. Nat. LXXIII (1957) 180, I pointed out that the rhachis structure in *Lastreopsis* differed from that of *Ctenitis* and *Polystichopsis* auct. (i.e. the genus now known as *Arachniodes* Bl.), this theme being further expanded in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 57. The structure of the rhachises in *Arachniodes* is dryopteroid and is rather similar to that of *Polystichopsis* sens. strict. except that the grooves are never clothed with hairs, also the edge of the leaflets in *Arachniodes* is never thickened and never continuous with any of the ridges of the frond. In *Lastreopsis* there are usually 1 or 2 oblong or sometimes orbicular, glandular hairs on the pedicel of each sporangium, whereas in *Arachniodes* these glands are absent in all the species which I have examined. Both *Lastreopsis* and *Arachniodes* have free veins in the lamina and, in most of the species, orbicular-reniform or apparently peltate indusia on the round sori.

Holttum summarized the research of various botanists (including himself) on the " Vegetative characters distinguishing the various groups of ferns included in *Dryopteris* of Christensen's Index Filicum, and other ferns of similar habit and sori " in Gardens' Bull., Singapore XVII, 3 (1960) 361-7.

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* In Acta Botanica Sinica X, 3 (1962) 263, Ching considered that *Polystichopsis* in the sense used in my monograph has no name. However, since *Polystichopsis* sensu Holttum in Ferns of Malaya (1954) 484, is invalid, as the basionym was not cited, I consider that *Polystichopsis* in generic rank dates from Morton in Amer. Fern. Journ., L (1960) 155 (see also Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961) 57).

Mme. Tardieu-Blot added another species to *Lastreopsis* in Humbert, Fl. Madagascar, 5^{e} Fam., I (1958) 347, when she transferred *L. boivinii* (Bak.) Tard. to this genus.

In my revision of this genus I have now included 33 species in *Lastreopsis* but there are probably several undescribed species in Tropical West Africa and the Kermadec Islands.

AFFINITIES OF THE GENUS

I consider that *Lastreopsis* is more closely allied to *Ctenitis* and *Polystichopsis* than to any other genera, all having the distinctive, articulated *Ctenitis*-hairs which have dark red septa. One of these hairs is illustrated in Pl. IX, f. 6. However, in *Ctenitis* and *Lastreopsis* the configuration of the upper surface of the main rhachis is of the ctenitoid or davallioid types, whereas in *Polystichopsis* it is of the dryopteroid type (see p. 255). As most of the species of *Lastreopsis* have been placed formerly in *Ctenitis*, the affinities of these two genera are discussed in detail below:—

Christensen segregated five groups of *Dryopteris* subgen. *Ctenitis* in Vid. Selsk. Skr. VIII, 6 (1919) 1920, 14-15, 31-32. In his Ind. Fil., Suppl. 3 (1934) 7, he raised each of these five groups to the rank of section in *Dryopteris* subgen. *Ctenitis*. They are as follows:— Sect. 1 *Euctenitis* (the group of *Dryopteris submarginalis* (Langsd. et Fisch.) C. Chr.); Sect. 2 *Hirtae* (the group of *D. hirta* (Sw.) O. Ktze.); Sect. 3 *Amplae* (the group of *D. ampla* (H. B. Willd.) O. Ktze.); Sect. 4 *Subincisae* (the group of *D. subincisa* (Willd.) Urban); Sect. 5 *Protensae* (the group of *D. protensa* (Afzel. ex Sw.) C. Chr.). Christensen refers, in Ind. Fil. Suppl. 3 (1934) 6, to his monograph on *Dryopteris* in Vid. Selsk. Skr. VIII, 6 (1919) 1920. However the manner in which he has raised these groups to sections may not be considered valid, so that I have added latin diagnoses to my new combinations, when I have transferred three of these sections to *Ctenitis* subgen. *Ctenitis* (see p. 252). I have noted that the configuration of the adaxial surface of the upper stipe and main rhachis varies slightly even within these five groups (see Plates XVI, f.4, XVII to XIX), although the basic pattern is very similar and the 2 ridges are never continuous with the leaf-edge which is always unthickened. In this way they differ markedly from *Lastreopsis* (see Plate XVI, f.1), also in the latter genus there is a raised central portion between the 2 ridges.

Ctenitis was raised to generic rank by Christensen and Ching in Bull. Fan Mem. Inst. Biol., Bot. Ser. VIII, 5 (1938) 280, where Ching divided *Ctenitis* into two subgenera viz. *Euctenitis* and *Dryopsis*. In the former subgenus, which must now be known as *Ctenitis* under the present International Code of Botanical Nomenclature, the upper stipe and main rhachis are characterized by scales which are hair-pointed, clathrate and usually ciliate or denticulate. In subgen. *Dryopsis* these scales are thick, opaque, acuminate, entire or subentire, ovate-acuminate and red-brown or linear-subulate, patent, atropurpureous or blackish, the lumina being very narrow, elongated and dark.

The subgen. *Ctenitis* may be described as follows:— *Rhizome* erect or oblique. *Scales* of the upper stipe and the main rhachis clathrate, hair-pointed, the margins mostly denticulate or ciliate, the lumina large, colourless, iridescent, clear and hexagonal. *Lamina* quinquangular or bipinnatifid. *Spores* mostly echinate but sometimes ruguloso-saccate or irregularly crested.

I am transferring the first four sections of *Dryopteris* subgen. *Ctenitis* segregated by Christensen in his Ind. Fil., Suppl. 3 (1934) 7, to *Ctenitis* subgen. *Ctenitis*, viz. *Euctenitis* (as sect. *Ctenitis*), *Hirtae*, *Amplae* and *Subincisae*. Latin diagnoses have been added to three of my new combinations, as I am uncertain whether Christensen's new combinations in Ind. Fil. Suppl. 3 (1934) 7 are valid.

The "group" of *Ctenitis submarginalis* (L. et F.) Copel. includes the type species of the genus, i.e. *C. distans* (Brack.) Ching of Brazil, so that it becomes sect. *Ctenitis* when transferred from *Dryopteris* sect. *Euctenitis*. This section is characterized by an erect or oblique rhizome, a bipinnatifid lamina with simple veins, costae always clothed with common *Ctenitis*-hairs on the upper surface, and spores which are echinate, ruguloso-saccate or irregularly crested. The structure of the upper surface of the main rhachis is illustrated in Plate XVIII, f. upper.

The "group" of *C. hirta* (Sw.) Copel. is transferred to the rank of *Ctenitis* sect. *Hirtae* (C. Chr.) Tindale **comb. nov.** (BASIONYM: *Dryopteris* Adanson subgen. *Ctenitis* C. Chr. sect. *Hirtae* C. Chr.) in Ind. Fil. Suppl. 3 (1934) 7).

Rhizoma erectum vel obliquum, paleis rufo-brunneis, angustissimis, haud clathratis, margine pilis glandulosis, orbicularibus ornatis, dense vestitum. Lamina ovata, numquam quinquangularis, bipinnato-decomposita, raro bipinnatifida. Stipites et rhachides paleis crinitis, nigris, capillosis, retrorsis vel patentibus ornati. Costae et costulae paleis plerumque bullatis subtus vestitae. Sporae bilaterales, echinatae vel aliquando ruguloso-saccatae.

Rhizome erect or oblique, densely clothed with red brown, very narrow, non-clathrate scales in which the margin has round glandular hairs. *Lamina* ovate, never quinquangular, bipinnate-decompound, rarely bipinnatifid. *Stipes* and *rhachises* clothed with crinite, black, hair-like, retrorse or patent scales. *Costae* and *costules* clothed beneath with scales which are usually bullate. *Spores* bilateral, echinate or sometimes ruguloso-saccate.

TYPE SPECIES: *Ctenitis hirta* (Sw.) Copel., of the West Indies.

I am transferring the "group" of *C. subincisa* to the rank of *Ctenitis* sect. *Subincisae* (C. Chr.) Tindale **comb. nov.** (BASIONYM: *Dryopteris* Adanson subgen. *Ctenitis* C. Chr. sect. *Subincisae* C. Chr. in Ind. Fil., Suppl. 3 (1934) 7).

Rhizoma erectum vel obliquum, saepe caudicem parvum 1-2 m. altum efformans, paleis plerumque sparse vestitum. Lamina bipinnatifida. Costae et costulae pilis strigosis, antrorsis, albidis vel brunneis, subulatis vel saepe falcatis pilis Ctenitidoideis quoque ornatae. Sporae bilaterales, echinatae vel raro ruguloso-saccatae.

Rhizome erect or oblique, often forming a small trunk 1 to 2 m. high, usually sparsely clothed with scales. *Lamina* bipinnatifid. *Costae and costules* clothed with strigose, antrorse, whitish or brown, subulate or often falcate hairs as well as with *Ctenitis*-hairs. *Spores* bilateral, echinate or rarely ruguloso-saccate.

TYPE SPECIES: *Ctenitis subincisa* (Willd.) Ching, of Tropical America.

The "group" of *C. ampla* is being transferred to the rank of *Ctentis* sect. *Amplae* (C. Chr.) Tindale **comb. nov.** (BASIONYM: *Dryopteris* Adanson subgen. *Ctenitis* C. Chr. sect. *Amplae* C. Chr. in Ind. Fil., Suppl. 3 (1934) 7).

Rhizoma erectum vel obliquum, paleis longis, angustis, haud clathratis, plerumque aurantiaco-rufis dense ornatum. Lamina quinquangularis, decomposita, tenuis et mollis. Costae et costulae paleis numquam bullatis subtus vestitae. Sporae bilaterales, echinatae.

Rhizome erect or oblique, densely clothed with long, narrow, non-clathrate, mostly orange-red scales. *Lamina* quinquangular, mostly basiscopically produced, decompound, thin and soft. *Costae* and *costules* clothed beneath with scales which are never bullate. *Spores* bilateral, echinate.

TYPE SPECIES: *Ctenitis ampla* (H. B. Willd.) Copel., of Central and South America.

Superficially the fronds of sect. *Amplae* resemble those of *Lastreopsis*, since they are quinquangular and mostly basiscopically produced. However this section of *Ctenitis* differs from *Lastreopsis* chiefly in the iridescent scales of the lamina and the very soft, orange-red scales of the rhizome. In sect. *Amplae* the configuration of the rhachis is typical of the genus *Ctenitis*, being very similar to that of *C. vilis* (see Plate XVII, f. 1). The spores of the *C. ampla* group are mostly echinate which is rare in *Lastreopsis*. *C. lanuginosa* (Willd.) Copel. is a common African member of the *Amplae* (see Alston in Ferns and Fern-Allies of West Tropical Africa (1959) 71).

The subgen. *Dryopsis* Ching may be described as follows:— *Rhizome* erect, oblique or widely creeping. *Lamina* quinquangular, the lowest pair of primary pinnae basiscopically produced. *Main rhachis* sometimes with gemmiferous bulbils. *Scales* of the upper stipe and main rhachis non-clathrate, thick, opaque, the apex acuminate, the margin entire or almost so, ranging from red-brown and ovate-acuminate to blackish or blackish-purple, patent and linear-subulate, the lumina being dark, elongated and very narrow. *Spores* ruguloso-saccate and brown or rarely echinate and black.

In Bull. Fan Mem. Inst. Biol., Bot. Ser. VIII, 5 (1938) 281-297, Ching has listed 20 Asiatic species belonging to this subgenus. Most of them are characterized by short, erect or oblique rhizomes e.g. *Ctenitis maximowicziana* (Miq.) Ching, of Japan and China, and *C. vilis* (Kze.) Ching, of Java, both being typical members. The structure of the upper surface of the rhachises in these two species is illustrated in Plates XVI, f. 4-5, XVII respectively. The spores are usually brown and ruguloso-saccate in this group, although a few species have echinate spores e.g. *C. apiciflora* (Wall. ex Mett.) Ching, of Northern India, Yunnan and Formosa.

The " group " of *Ctenitis protensa* (Afzel. ex Sw.) Ching which occurs in Africa, Central and South America, is characterized by crested spores, widely creeping rhizomes (except shortly creeping in *C. securidiformis* (Hook.) Copel.), and decompound, sometimes almost tripartite laminas with obtuse, ultimate segments. The laminal hairs are all of the common *Ctenitis*-type. The structure of the upper surface of the main rhachis of *C. protensa* var. *funesta* (Kze.) Proctor is illustrated in Pl. XIX. The following species are also members of this group:— *C. vogelii* (Hook.) Ching, *C. pentagona* (Bonap.) Ching, *C. fraterna* (Mett.) Tard., *C. jenseniae* (C. Chr.) Tard., *C. lanigera* (Kühn) Tard., *C. pilosissima* (J. Sm.) Alston and *C. speciosa* (Mett.) Alston.

However, I have not examined sufficient material in subgen. *Dryopsis* to describe sections. In both the groups of *C. maximowicziana* and *C. protensa* the transverse sections of the upper stipe are characterized by 2 large vascular bundles in the adaxial portion and 2 to 7 smaller bundles in the abaxial portion. Each bundle is surrounded by a dark-coloured endodermis, also there is a fairly wide band of sclerenchyma below the epidermis. (See Plates XVI, f. 4 and XIX, right-hand photo).

Both *Lastreopsis* and *Ctenitis* were formerly placed in *Dryopteris* which used to be construed on a wide basis even including the members of the present Thelypteridaceae. In Bull. Fan Mem. Inst. Biol., Bot. Ser. VIII (1938) 278, Ching pointed out the difference in rhachis structures between *Ctenitis* and *Dryopteris*. Both *Lastreopsis* and *Ctenitis* differ from *Dryopteris* sens. strict. by the absence of *Ctenitis*-hairs in the latter genus as well as in the configuration of the rhachis. A table indicating the affinities of *Lastreopsis* with some of its more closely allied genera is set forth as follows :

	Dryopteris	*Arachniodes*
Rhizome	short and erect or sometimes oblique, thick or woody, often subarborescent.	mostly long-creeping, rarely short and erect.
Scales of the rhizome	non-clathrate, entire, fimbriate or slightly dentate or with glandular margins, rarely lacerate.	entire or subentire, uniform, the teeth formed by 2 adjacent cells.
Venation plan . .	catadromous.	anadromous.
Texture of lamina . .	thickly chartaceous to subcoriaceous.	harsh, prickly coriaceous or thinly papyraceous.
Margins of pinnules . .	bluntly serrate, never aristate.	aristate or dentate.
Leaf-margins decurrent as wings or ridges . .	leaf-margins decurrent as lateral wings.	leaf-margins decurrent as lateral wings.
Shape of lamina . .	oblong, oblong-ovate to deltoid-ovate, oblanceolate or rarely quinquangular.	quinquangular.
Glands of the lamina	stalked, capitate hairs or absent.	absent or sparse.
Gemmiferous buds on main rhachis . .	absent.	absent.
Configuration of upper surface of main rhachis and secondary rhachises.	dryopteroid.	dryopteroid.
Ctenitis-hairs	absent.	absent.
Sori	orbicular.	orbicular.
Indusium	usually large, brown or red-brown or grey, orbicular-reniform, thick, persistent, entire and with a deep sinus, rarely absent.	thickly coriaceous, subrotund, laterally attached at a closed sinus, appearing to be centrally peltate.
Glands on pedicels of sporangia	present or absent.	absent.
Spores	ruguloso-saccate or winged.	crested, the crests spinulose in some species.

Lastreopsis	*Ctenitis*	*Polystichopsis*
long-creeping, shortly creeping, short and erect or oblique.	long-creeping, shortly creeping, short and erect or oblique.	long-creeping or shortly creeping.
entire, slightly to markedly denticulate or sometimes fimbriate.	clathrate or opaque, entire, subentire, denticulate or ciliate.	non-clathrate, subentire, with a few capitate glands or fimbriae along the margin.
mostly catadromous at least at the base, rarely anadromous.	catadromous except in the first division in basal pair of pinnae.	anadromous throughout or catadromous at base only.
membranous to coriaceous or sometimes papyraceous.	submembranous to herbaceous or rarely subcoriaceous.	herbaceous, thinly chartaceous to coriaceous.
entire, crenate, denticulate, aristate or spinulose-dentate.	entire or crenate.	obtusely dentate, crenate or serrate, the apices submucronate, sharply acute or obtuse.
leaf-margins decurrent as ridges.	leaf-margins decurrent as lateral wings.	leaf-margins decurrent as lateral wings but basiscopic margin slightly thickened.
quinquangular.	ovate, oblanceolate, oblong-ovate and bipinnatifid or deltoid and decompound, sometimes quinquangular.	quinquangular, ovate or deltoid.
oblong or round, red, orange, yellow or cream, sessile glands almost always present.	red, orange or yellow, round or oblong, absent in some species.	yellow or orange, capitate glands, absent in some species.
present in some species.	present in *C. jenseniae* and *C. securidiformis*.	absent.
davallioid.	ctenitoid i.e. main rachis with a median groove which is not open to admit the shallow groove of each secondary rachis (if present).	dryopteroid.
present.	present.	present.
orbicular or rarely slightly oblong.	orbicular.	orbicular.
orbicular-reniform, reniform or rarely subpeltate, sometimes absent.	small, thin, fugaceous or rarely subpersistent, the margin ciliate, orbicular-reniform, sometimes absent.	reniform-orbicular with long, fine hairs or absent.
1 or 2 glands in most species.	present in a few species.	rarely present.
ruguloso-saccate, crested (the wings sometimes echinulate) or rarely echinate.	usually echinate, sometimes crested or ruguloso-saccate.	ruguloso-saccate.

CYTOLOGY

Chromosome counts have been made by various botanists for 12 species of *Lastreopsis* from Australia, New Zealand, New Caledonia, Ceylon and Africa. Most of them are diploids, the base number being $n = 41$ which is also characteristic of *Ctenitis*, *Arachniodes* and *Polystichum*.

Diploids have been recorded from several continents. Those counted have been listed below. In Phil. Trans. Roy. Soc., London, Ser. B, Biol. Sci. No. 654, Vol. CCXXXVIII (1954) 160, Manton & Sledge recorded a count of $n = 41$ for Singhalese material of *L. tenera* (as *Ctenitis recedens*) which is a cosmopolitan species. Brownlie has obtained a count of $n = 41$ on New Caledonian material of this species (personal communication, see p. 320). A count of $n = 41$ was made for material of *L. currori* (as *Ctenitis efulensis*) from Ghana by Prof. Manton in the appendix to Alston, Ferns & Fern-Allies of West Tropical Africa (1959) 81. She also recorded counts of $n = 41$ on two collections of *L. shepherdii* from Australia. These were published with her kind permission in my treatment of the genus in Contrib. N.S.W. Nat. Herb., Fl. Ser. No. 211 (1961) 67, together with a count of $n = 41$ for Australian material of *L. microsora* (l.c. 76). B. G. Briggs and M. D. Tindale obtained a count of $n = 41$ for material of *L. smithiana* which originally was brought from Mt. Glorious, Queensland, Australia (see under this species in the text). B. G. Briggs made chromosome counts of $2n = 82$ for Australian material of *L. rufescens* and *L. decomposita* and $2n = 82 \pm 2$ for *L. marginans* which is native to Queensland and New South Wales (personal communication see p. 316). Brownlie obtained a count of $n = 41$ for a New Caledonian species *L. vieillardii* (personal communication, see p. 277). Two diploids have also been recorded amongst the New Zealand species of *Lastreopsis*. In Trans. Roy. Soc. N.Z. LXXXV (1958) 214, Brownlie published a count of $n = 41$ for New Zealand material of *L. hispida* which also occurs in Australia, a similar count being made for *L. velutina*, a species endemic to New Zealand.

Brownlie has also recorded two tetraploids from New Zealand, viz. $n = 82$ for *L. glabella* (as *Ctenitis glabella*) in Trans. Roy. Soc. N.Z. LXXXV (1958) 214, and a similar count for the New Zealand subspecies of *L. microsora* (under *Ctenitis decomposita*) in Trans. Roy. Soc. N.Z. I (1961) 2. As the latter subspecies is usually almost indistinguishable from Australian material of *L. microsora*, no particular trend is apparent in this case.

Too few counts have been made to draw conclusions from the cytological evidence about evolution in this genus except that the base number of $n = 41$ is very constant. Species with short erect rhizomes, shortly creeping and long-creeping rhizomes occur amongst the diploids as well as the tetraploids.

It is interesting that the chromosome base number of *Ctenitis* is $n = 41$ as in the genus *Lastreopsis* to which it is closely allied morphologically. Chromosome counts of the following species in *Ctenitis* subgen. *Ctenitis* (mentioned on pp. 252 and 253) have been recorded:—*Ctenitis maximowicziana* (Miq.) Ching $n=41$ (Kurita 1961[*]); *C. submarginalis* (Langsd. et Fisch.) Copel. $n = 41$ (Wagner 1963[†]); *C. ampla* (Humb. et Bonpl.) Copel. $n = 41$ (Wagner 1963[†]). Several chromosome counts of *Ctenitis* subgen. *Dryopsis* for African species were published by Manton in Alston, Ferns & Fern-Allies West Trop. Africa (1959) 80-1. In *Ctenitis lanigera* (Kühn) Tard. $n =$ ca. 82; *C. jenseniae* (C. Chr.) Tard. $n = 82$; *C. protensa* (Afzel. ex Sw.) Ching and *C. pilosissima* (J. Sm.) Alston $n = 82$, but in *C. securidiformis* (Hook.) Copel. $2n = 123$ (T. Walker).

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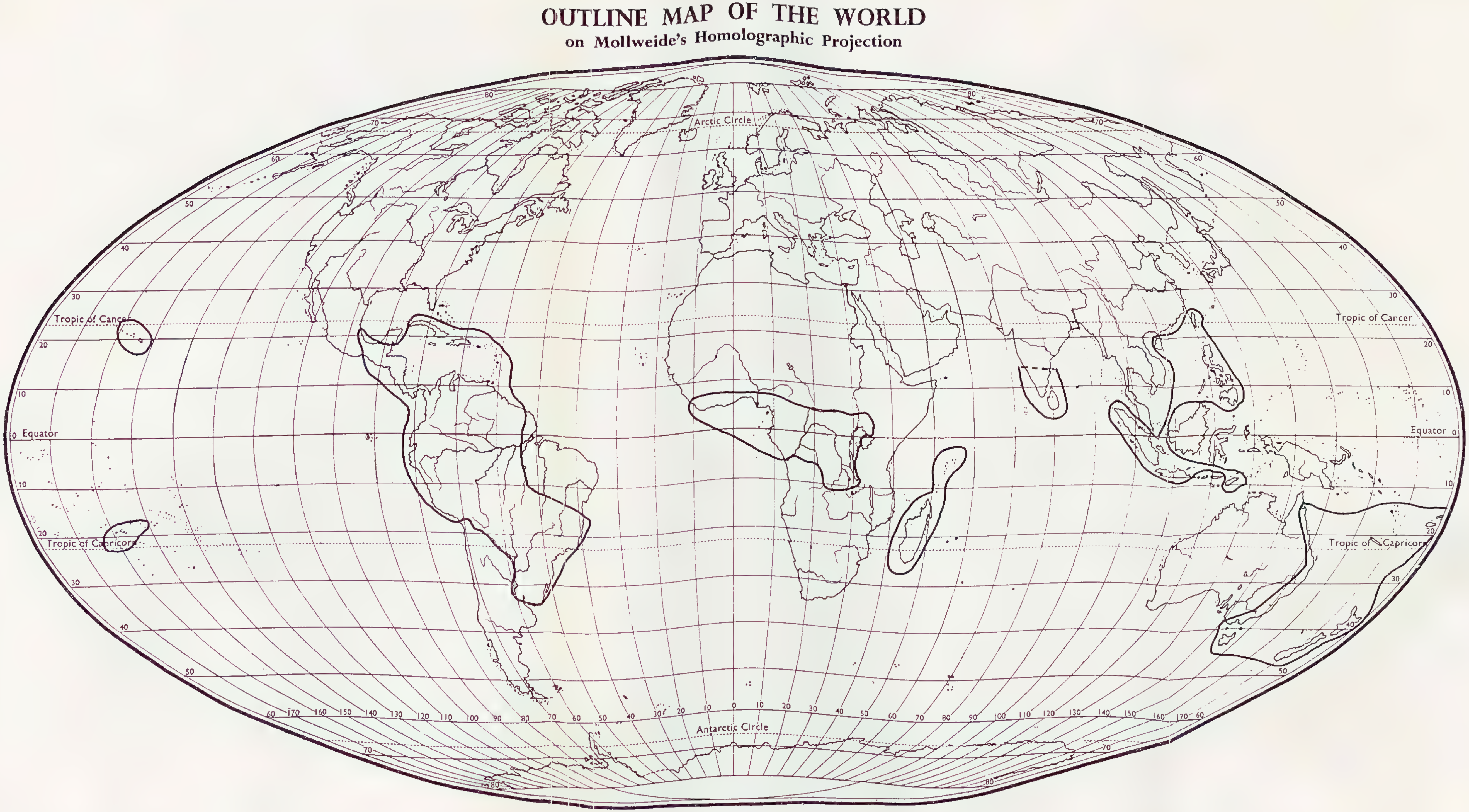
[*] Kurita, S. in Bot. Mag., Tokyo LXXIV (1961) 395.

[†] Wagner, W. H. Jnr. in Amer. Fern Journ. LII (1963) 10.



Map 1. World Distribution of the genus *Lastreopsis*.

GEOGRAPHIC DISTRIBUTION OF THE SPECIES

There are about 33 species ranging from tropical America to Africa (including the islands off its east coast), Asia (as far north as Formosa), Australia, New Zealand and Polynesia. This genus appears to be unrepresented in Europe, Western Asia and North America (north of Mexico). Most of the species are found in tropical or subtropical rainforests but others occur in temperate rainforests dominated by *Nothofagus* spp. and a few are even found in sclerophyll forests close to rainforests. The largest number of species is found in Australia with 11 species on the mainland (2 extending to Tasmania) as well as 1 species on Lord Howe Island and 2 on Norfolk Island which are Australian dependencies off the East Coast. This makes a total of 13 species in the Australian zone as compared with 4 species in New Zealand, 4 in New Caledonia and 3 in the Fiji-Samoa-Tahiti region. This genus is represented by 5 species in Central and South America as well as by 7 in Africa where the majority of the species are found on the Tropical West Coast. Only 4 species are recorded from south-eastern Asia without any species being recorded from New Guinea or Malaya, because the fern formerly known as *Lastreopsis parishii* (Hook.) Ching is not considered to be a member of this genus, since the structure of the upper surface of the main rhachis is not the same as in *Lastreopsis.*

The species of each zone are discussed separately.

Australian Species

L. calantha is endemic to Norfolk Island and *L. nephrodioides* to Lord Howe Island, both species being closely related to *L. microsora* and *L. decomposita.* There are 11 species in Australia being mainly restricted to the eastern States including Tasmania, although *L. shepherdii* extends to South Australia and *L. decomposita* to Norfolk Island. No species have been recorded from Western Australia or the Northern Territory. The south-eastern Australian species are *L. hispida, L. shepherdii, L. smithiana, L. silvestris, L. decomposita, L. microsora, L. munita* and *L. marginans.* Both *L. shepherdii* and *L. hispida* extend from the mainland of Australia to Tasmania, whereas the latter species is quite common in New Zealand. *L. smithiana* and *L. silvestris* have comparatively localized distributions i.e. both occur in the McPherson Range on the border between New South Wales and Queensland, although *L. smithiana* extends to the Mt. Glorious National Park, north of Brisbane. *L. shepherdii* ranges from south-eastern Queensland to Tasmania and South Australia, whereas *L. decomposita* is a common species from Conondale, south-eastern Queensland, to far eastern Victoria. Both *L. munita* and *L. marginans* range from Kin Kin, south-eastern Queensland, to the North Coast of New South Wales. *L. rufescens* and *L. wurunuran* are found in the tropical rainforests of north-eastern Queensland but *L. tenera* extends in Australia from the islands of Torres Strait to Mt. Perry, Central Queensland. A species with a wide distribution is *L. microsora* which occurs in rainforests from Cairns, north-eastern Queensland, to East Gippsland.

New Zealand Species

There are 4 species in New Zealand, three of which were formerly placed in *Ctenitis*, viz. *L. glabella, L. velutina* and *L. microsora* ssp. *pentangularis.* The other species, *L. hispida,* was formerly referred to *Rumohra* s. lat. by several authors. Both *L. glabella* and *L. velutina* are endemic to New Zealand, whereas *L. microsora* ssp. *pentangularis* is a geographic subspecies of a species which is very common in eastern Australia.

Polynesian Species

L. tenera has been recorded from Fiji, whereas *L. davallioides* ranges from Tahiti, Samoa, Fiji to the New Hebrides. The latter species is closely allied to *L. amplissima* of South America. I am also describing a new species from Samoa, the Society and Cook Islands, this being named *L. pacifica.*

New Caledonian Species

Of the 4 species recorded from New Caledonia, 2 are endemic (i.e. *L. vieillardii* and *L. subsericea*) and 2 have a wide distribution from Australia to south-eastern Asia (i.e. *L. tenera* and *L. rufescens*).

African Species

This genus is well represented by 7 species in Africa ranging from Tropical West Coast to Uganda and the Republic of the Congo southwards to the Malagasy Republic and the Seychelles. Gemmiferous bulbils are present in 4 species i.e. *L. vogelii, L. nigritiana, L. currori* and *L. subsimilis* which are found in Tropical West Africa, although the 2 latter species extend to the Malagasy Republic. However, these bulbils are absent in *L. hornei* (Seychelles and Malagasy Republic), *L. boivinii* (Malagasy Republic) and *L. barterana* (West Tropical Africa).

American Species

There are 5 species in the rainforests of Central and South America, the commonest of these being *L. effusa* which ranges from the West Indies and Mexico to Peru and Paraguay. According to Christensen in his Monograph of the Genus *Dryopteris* II (1920) 110, *Lastreopsis amplissima* (as *Dryopteris amplissima*) is common in southern Brazil. *L. acuta, L. exculta* and *L. effusa* are characterized by gemmiferous bulbils on the main rhachis but in *L. killipii* and *L. amplissima* they are absent.

South Eastern Asian Species

L. tenera is widely distributed from southern India and Ceylon to Sumatra and northwards to Formosa. The only other 3 species from this region so far placed in the genus *Lastreopsis* are *L. subsparsa* (Java and Timor), *L. subrecedens* (Hainan Island) and *L. rufescens* (Java, Bali, Flores and Ceylon but extending to Australia and New Caledonia).

RELATIONSHIPS OF THE SPECIES

Several groups of closely related species are apparent but I can make few suggestions about which characters might be primitive and the cytological evidence does not give any assistance to date. Two species have very wide ranges but they do not appear to be closely related to each other. They are *L. tenera* which extends from Formosa to South India and New Caledonia, and *L. effusa* which is widely distributed from Mexico to South America. The latter species usually has proliferous, scaly buds on the main rhachis but they are always absent in *L. tenera.*

The *L. amplissima* group is composed of *L. killipii* (Central and South America) and *L. davallioides* (Pacific Islands). They are characterized by anadromous fronds which suggests an affinity with *Arachniodes,* as well as by club-shaped, glandular hairs on the upper surface of the rhachises. The axes are clothed with entire or denticulate, often subclathrate scales but gemmiferous bulbils are always absent on the rhachises. A species with affinities to this group and connecting it with the

L. microsora series is *L. hispida* which is found in Australia and New Zealand. It also has finely echinulate, cristate spores, club-shaped hairs on the rhachises, orbicular-reniform to subpeltate indusia and non-proliferous fronds but the lamina is catadromous at the base and anadromous above, and peculiar, bristle-like scales with bulbous-bases are found on the stipes and rhachises.

In Africa the group of *L. currori* is characterized by gemmiferous bulbils on the main rhachis, stout erect rhizomes clothed with dark brown scales, indusiate or exindusiate sori and finely decompound fronds. *L. vogelii* and *L. nigritiana* are also members of this group in which there may be several undescribed species. This group needs critical collecting and field work. *L. subsimilis*, with its oblong sori and prostrate rhizome but proliferous buds on the rhachis, is not so closely allied to the *L. currori* group.

In the *L. shepherdii* group there are 4 species from Australia, New Zealand and Indonesia. They are characterized by erect rhizomes covered with the broken bases of the old stipes, by large, rather persistent indusia, by mostly spinulose-dentate margins of the lamina and by non-gemmiferous rhachises. One member of this group, *L. subsparsa*, from Indonesia, is superficially very similar to *L. rufescens* which also occurs in that country, but differs in the erect rhizome and indusiate sori of the former species. In the *L. shepherdii* group the lamina is catadromous at the base only.

L. wurunuran, *L. munita* and *L. rufescens* form a small group of exindusiate species with creeping rhizomes. They occur in Eastern Australia, although *L. rufescens* ranges to Indonesia, Ceylon and New Caledonia.

Three species (*L. tenera*, *L. marginans* and *L. decomposita*) form a series characterized by non-gemmiferous, markedly catadromous fronds, sessile, displaced pinnules towards the apex of each main rhachis and by shortly creeping, compact rhizomes with numerous, dark brown scales. There are scattered, dark brown, often bullate paleae along the axes in these species as well as in *L. silvestris* of the McPherson Range, Australia. The latter species also belongs to this group, although the rhizome appears to be longer creeping. In *L. tenera* and *L. marginans* the mature indusia are minute and black or almost so, also the glands on the fronds are frequently orbicular, although oblong glands do occur in some specimens. In most species of *Lastreopsis* these glands tend to be oblong. All of these species occur in Eastern Australia, although *L. tenera* extends to Asia and New Caledonia.

Another group is formed by *L. pacifica*, *L. microsora* and *L. calantha* all of which occur in Australasia and the Pacific Islands. They have narrow, long-creeping, sparsely scaly rhizomes, mostly spinulose-dentate laminal margins and fronds which are catadromous only near the base. *L. nephrodioides* (of Lord Howe Island) is an aberrant species in which the sori are sometimes borne on short marginal projections of the lamina but often the sori are medial or submarginal. This species is characterized by tufts of fairly long, appressed hairs at the junctions of the main and secondary rhachises as well as at the junctions of the costae and secondary rhachises. These tufts of hairs also occur in *L. calantha* and sometimes in *L. microsora*. *L. nephrodioides* has a stouter, more densely scaly rhizome but it was broken in all of the specimens which I examined.

The group of *L. effusa*-*L. exculta* is widely distributed in Central and South America, being represented by a number of subspecies. These 2 species are usually characterized by evenly winged secondary rhachises and by the presence of gemmiferous scaly bulbils near the apex of the main rhachis. *L. effusa* is exindusiate whereas the closely related *L. exculta* has small, brown or dark brown indusia covering the sori.

In the Malagasy Republic there are 2 very closely allied species, viz. *L. boivinii* and *L. hornei* (the latter also extending to the Seychelles). Subsequent collections may prove that they are conspecific.

Two New Caledonian species are somewhat aberrant, one of them being *L. vieillardii* which is superficially very similar to the genus *Tectaria* and is characterized by glabrous upper surfaces of the main rhachises. A South American species, *L. acuta*, shows affinities with *L. vieillardii*, although it is gemmiferous by scaly bulbils. The other aberrant species from New Caledonia is *L. subsericea* in which the spores are black and echinate, being very similar to those of many species of *Ctenitis*.

L. velutina (New Zealand) forms another aberrant line. The lower edge of the ultimate segments is much less thickened than in other species of *Lastreopsis*, but the upper surface of the main rhachis has the configuration typical of this genus. There is a tuft of soft, castaneous scales on the rhizome, these paleae being very similar to those of the *Ctenitis ampla* group, although those of *L. velutina* are not clathrate.

However there are plenty of species linking up the groups which I have enumerated above. Some species are very uniform, whereas others such as *L. decomposita* and *L. microsora* are polymorphic and appear to be evolving new forms especially in the McPherson Range on the border of Queensland and New South Wales, Eastern Australia, where the genus is well represented in the subtropical and temperate rainforests. This might be a centre of evolution, as 2 species with very localized distributions, viz. *L. smithiana* and *L. silvestris* appear to radiate from that region.

THE CRITERIA OF SPECIFIC CLASSIFICATION

A critical review is given below of the diagnostic characters of the genus.

Rhizome

The type of rhizome is of great importance since many species are characterized by short, erect, stout rhizomes, whereas in others it is shortly creeping and compact, or long-creeping.

The scales of the rhizome and base of the stipes fall into 2 main groups viz. the *L. amplissima* series in which the margin has claw-like teeth and the scales are castaneous and more or less clathrate as a rule. In the *L. decomposita* series the paleae are always non-clathrate, also the margin is more or less entire, sometimes fimbriate (e.g. *L. smithiana*) or rarely with a few scattered teeth. Most of the scales in this group are dark brown, although in *L. velutina* there is a soft mass of castaneous paleae. In *L. wurunuran* peculiar, dark brown, very broadly ovate to more or less orbicular squamules are found on the rhizome and also amongst the long hairs at the base of the stipes.

Stipes and Rhachises

The indumentum is very important, also the colour of the stipes and rhachises is often quite helpful in distinguishing between species. The configuration of the upper surface of the main rhachis is critical as a generic character but is of little importance in distinguishing between species.

Scaly gemmiferous bulbils occur on the rhachises of a number of American and African species but never on those occurring in Asia, Australasia or the Pacific Islands. It will also be noted that not all the American or African species have these bulbils, also that they are sometimes absent in *L. effusa* and other species of *Lastreopsis* which normally bear them. In New South Wales 2 species of *Polystichum*, viz. *P. proliferum* (R. Br.) Presl and *P. australiense* Tindale, reproduce very efficiently by gemmiferous bulbils, whereas they are never present in the other 2 species from that State.

Lamina

The leaf-architecture or order of the pinnae and segments upon the rhachises etc. is of great importance. In 3 species (i.e. *L. killipii*, *L. amplissima* and *L. davallioides*) the lamina is always anadromous, whereas in other species of this genus the fronds are catadromous at the base and anadromous above. In addition a number of species are markedly catadromous throughout the lamina e.g. *L. marginans*, *L. tenera*, *L. silvestris* and *L. decomposita*.

The degree of dissection of the lamina and especially the margin of the ultimate segments are important features of specific classification. In a number of species the margin is spinulose-dentate, whereas in others it is crenate, dentate or aristate.

In some species the basal basiscopic leaflets of the primary and secondary pinnae are displaced downwards and are adnate to the major axis next below (e.g. *L. tenera*, *L. decomposita*, *L. velutina*, *L. marginans* etc.). This character is often useful but unfortunately it is not constant in some species, e.g. *L. microsora*.

Dermal Appendages

An important feature of this genus is the presence of red, orange, yellow or rarely cream-coloured, glandular hairs which are found on the rhachises, costae, minor veinlets, the surface of the lamina and on the indusia and pedicels of the sporangia. These glands, which resemble the eggs of certain insects, vary from few to very numerous but they are absent in a few species. However glandular hairs of this type do occur in some species of *Ctenitis*.

There is a great deal of variety in the type of hairs occurring in the fronds of *Lastreopsis* but a few *Ctenitis*-hairs are always present on the lamina or rhachises. Long, weak, acicular hairs, club-shaped hairs, 2-celled glandular-tipped hairs, strigose hairs and other types are found. They are of great assistance in delimiting the species.

Scales are found in a number of species of *Lastreopsis* on the rhachises and costae, usually being dark brown, entire or almost so, fibrillose or more or less bullate. However in the *L. amplissima* group the scales of the rhachises are entire or with claw-like, marginal teeth and are often subclathrate.

Venation

Whether the fronds are anadromous or catadromous is important but otherwise the venation is fairly uniform within the genus, being free and forked or pinnate. The minor veinlets rarely reach the margin of the ultimate segments of the lamina.

Sori

The sori are orbicular except in two African species, *L. subsimilis* and *L. currori* ssp. *eglandulosa*, in which they are short and oblong. The position of the sori may vary from medial to marginal even within a species, so that this feature is of little use as a means of diagnosis.

Indusia

This is an important criterion for separating the species, since the indusia rarely vary much within a taxon. The colour and size of the indusia are useful as well as the type of hairs and glands occurring on their surface and margin. There are a number of exindusiate species (e.g. *L. munita*, *L. vogelii*, *L. subsimilis*, *L. effusa*, *L. rufescens*, *L. barterana* and *L. wurunuran*), but this is probably a derived condition. In some species the indusia are very fugacious, whereas in others they shrivel, so that a careful search for them must be made under a microscope.

Sporangia

The sporangia are non-setulose, each having an elongated pedicel consisting of about 6 to 8 stories of cells. One or sometimes two red, orange or yellow, oblong or sometimes orbicular, stalked glands are often borne on the pedicels of most species, this being an important generic character. The annulus is composed of 12 to 18 (mostly 14 to 15) indurated cells which never extend beyond the insertion of the pedicel, and 6 to 10 thin-walled cells. There is lateral dehiscence through the stomium to free the spores.

Spores

The spores in this genus are always bilateral and monolete but the configuration of the perispore is an important diagnostic feature. Monolete spores are generally considered to be more advanced than trilete spores. In a high percentage of the species of *Lastreopsis* the perispore is either cristate or ruguloso-saccate (i.e. covered with balloon-like projections). In several species the crests are minutely echinulate. In *L. subsericea* of New Caledonia the spores are black and echinate, resembling those of many species of *Ctenitis*. However cristate and ruguloso-saccate spores do occur in the latter genus but they are less frequent than echinate spores.

HABITATS

The members of this genus are essentially rainforest ferns, many occurring in the tropics or subtropics but others in temperate rainforests where species of *Nothofagus* are the dominant trees. *L. silvestris* appears to be restricted to *Nothofagus moorei* temperate rainforests or the edge of the subtropical rainforests bordering them, on mountainsides between 3,000 to 3,800 ft. altitude. Some species, e.g. *L. shepherdii* and *L. hispida*, occur in subtropical rainforests in New South Wales but are also found in temperate *Nothofagus* rainforests in Victoria and Tasmania. The New Zealand species (*L. hispida*, *L. velutina*, *L. glabella* and *L. microsora* ssp. *pentangularis*) are found mainly in lowland temperate *Nothofagus* rainforests or in *Beilschmiedia-Podocarpus* forest. Two of the Australian species (*L. decomposita* and *L. marginans*) usually occur in subtropical rainforests but sometimes extend to the wet sclerophyll forests which border them. The New Caledonian species are terrestrial in tropical rainforests on the densely clothed mountainsides. *L. tenera* is widely distributed through the tropics but usually inhabits rainforests near rivers or streams, whereas in Australia this fern is also sometimes found in *Eucalyptus-Casuarina* forests or on small coral islands off the coast. Another species with an extensive range is *L. rufescens* but it is mainly found in tropical rainforests on hillsides in basaltic soil. The American species and those of West Africa mostly occur in the dense tropical rainforests.

All the species of *Lastreopsis* are terrestrial, except *L. davallioides* from the Pacific Islands, there being several records of the latter species occurring as an epiphyte. The other species usually form large colonies amongst the ground flora but a few species, e.g. *L. shepherdii*, occur in niches amongst rocks especially near waterfalls or streams. In eastern Australia *L. decomposita*, *L. microsora* and *L. marginans* are often the dominant fern species in a rainforest, whereas others, e.g. *L. smithiana*, are very localized in their habitat. The latter species appears to be restricted to a few localities in northern New South Wales and south-eastern Queensland where it occurs along creeks and grows almost in the water. *L. currori* of Tropical West Africa, is recorded as being found in wet mountain ravines, on wooded mountainsides or on the rocky beds of streams.

The species of *Lastreopsis* prefer very shady conditions away from the heat and drying winds. Some species usually occur near streams, others tolerate drier conditions and are found further up the hillsides or mountainslopes away from the watercourses. Most species form a considerable groundcover but as a rule other smaller ferns do not grow underneath them.

Species of this genus occur from almost sea level up to 5000 ft. alt. *L. effusa* has been recorded at the latter altitude in Jamaica by Jenman (see Christensen in Monograph of the Genus *Dryopteris* II (1919) 1920, 98).

LASTREOPSIS

Lastreopsis *Ching* in Bull. Fan Mem. Inst. Biol., Bot. Ser. VIII (9.1938) 157; Holttum, Ferns of Malaya (1954) 498; Tindale in Vict. Nat. LXXIII (1957) 180; Tardieu-Blot in Humbert, Fl. Madag. 5^{e}, 1 (1958) 346.

Polystichum sect. *Parapolystichum* Keyserling, Pol. Cyath. Bung. (1873) 11.

Dryopteris subgen. *Parapolystichum* (Keyserling) C. Chr. in Vid. Selsk Skr., ser. 8, VI (1920) 93.

Parapolystichum (Keyserling) Ching in Sunyatsenia V (1940) 239; D. Abbiatti in Rev. Mus. de la Plata, Neuva Ser., IX, Bot. No. 36 (1958) 1-16, No. 37, 1, pl. III, IV.

Terrestrial or rarely epiphytic ferns. *Rhizome* long-creeping, shortly creeping, oblique or erect, with a complex dictyostele; scales thin to thick or slightly woody, linear, narrowly lanceolate to narrowly ovate, red-brown, castaneous, golden-brown, brown to almost black, the apex acute, acuminate or hair-pointed, the margin entire, slightly denticulate, sometimes markedly denticulate as in *L. hispida*, *L. davallioides*, *L. killipii* and *L. amplissima* or with a few (rarely many) fimbriae or glandular-headed processes, rarely clathrate, never iridescent, dull to glossy, the cells thick-walled, rectangular or hexagonal, the lumina red, red-brown or yellow; in *L. wurunuran* the rhizome is clothed with almost orbicular to very broadly ovate squamules. *Stipes* containing several small vascular strands (Pl. XX, f. upper), fawn, light to dark brown, pinkish-brown or stramineous, with 2 prominent ridges on the upper surface, the channel between them clothed towards the apex as on the main rhachis, the base of each stipe clothed with similar scales to those on the rhizome as well as with long hairs in several species. *Main rhachis* bordered above by 2 prominent ridges which are continuous with the thickened leaf-margin of the ultimate segments of the primary pinnae, the broad, shallow, intervening channel almost filled (except towards the base in some species) by a slightly raised, median portion, the surface of which is rarely glabrous (e.g. in *L. acuta* and *L. vieillardii*) but is mostly clothed with *Ctenitis*-hairs (short, articulated, unbranched, multicellular, reddish hairs) or in other species (e.g. *L. velutina*, *L. wurunuran* and *L. subsericea*) with much longer, finer, articulated hairs or rarely glandular-pubescent; gemmiferous bulbils developed towards the apex of the main rhachis in some species. *Lamina* mostly decompound, rarely 2-pinnate, quinquangular, with the lowest pair of primary pinnae strongly basiscopically produced, catadromous throughout or more often anadromous in the upper segments, rarely anadromous throughout as in *L. amplissima*, *L. killipii* and *L. davallioides*. *Leaf-margin* of the ultimate segments of the lamina thickened especially towards the base and joined to the narrow rhachis-wing. *Tertiary rhachises* convex on the upper surface. *Basal basiscopic leaflet* of a primary or secondary pinna displaced downwards and adnate to the major axis next below in a number of species (e.g. *L. tenera*, *L. decomposita*, *L. silvestris*, *L. vieillardii*, *L. velutina*, *L. marginans* etc.), (see Pl. XI, f. 5; XII). *Basal basiscopic vein* of a vein-group usually springing from the costule but sometimes from the costa (e.g. *L. marginans*, *L. tenera*, *L. vieillardii* etc.). *Ultimate segments* with margins which are crenate, entire, denticulate, aristate or spinulose-dentate, the apex apiculate, acute, mucronate to broadly rounded. *Veins* free, the minor veinlets simple or forked, reaching the margin of the leaf-segments in some species, in others ending close to the margin, or of both types. *Sori* orbicular or rarely slightly oblong, up to 2 mm. in diam., marginal or superficial, terminal or medial on the simple minor veinlets or their acroscopic branches, indusiate or sometimes exindusiate. *Sporangia* glabrous, with an annulus composed of 12 to 18 indurated cells and 6 to 10 thin-walled cells including a lateral, 2-celled stomium, the pedicel long and narrow, usually with 1 or more rarely 2 oblong or rounded, red, orange or yellow, stalked glands. *Indusium* fawn, brown or rarely black, glabrous or villous, reniform-orbicular, reniform or rarely subpeltate, evanescent or persistent, about 0.2 to 1.5 mm. in diam., the margin crenate, entire or glandular-fimbriate. *Spores* globose-ellipsoidal, bilateral, monolete, with a perispore which is crested and with a broken or rarely uninterrupted, sometimes echinulate wing, or often ruguloso-saccate (i.e. covered with balloon-like wings over the whole surface of the spore), rarely black and echinate. *Glandular hairs** cylindrical or rarely round, bright yellow, orange, red or rarely cream-coloured, scattered over the whole surface of the lamina, costae, costules and sometimes on the indusia. *Gametophyte* heart-shaped when mature (see p. 274).

TYPE OF GENUS: *Lastreopsis recedens* (J. Sm. ex T. Moore) Ching which is a synonym of *L. tenera* (R. Br.) Tindale, a native of eastern Queensland, Ceylon, the Philippines, southern India, Bali, Fiji, Sumatra, Formosa and New Caledonia. An account of the synonymy of *L. tenera* is given by Tindale in Vict. Nat. LXXIII (1957) 181.

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* Eglandulose or almost eglandulose forms have been recorded in *L. effusa* (America), as well as in *L. subrecedens* (Hainan Island), *L. subsparsa* (Indonesia), *L. subsimilis* (Africa) and *L. currori* (Africa).

KEY TO THE SPECIES

1. Scales of the rhizome markedly denticulate, the teeth claw-like. Upper surface of the rhachises clothed with 1- to 4-celled, club-shaped, glandular hairs. Axes usually clothed with entire or denticulate scales or in *L. hispida* with bulbous-based, bristle-like scales. Fronds anadromous throughout or in *L. hispida* catadromous at the base only. Spores cristate, the crests echinulate or minutely papillose. Indusia always present, orbicular-reniform to subpeltate. Gemmiferous bulbils absent.

2. Lamina anadromous throughout. Axes clothed with entire or denticulate, non-bristle-like scales without bulbous bases.

3. Rhizome long-creeping .. .. *L. davallioides* 1.

3.* Rhizome short and erect or shortly creeping.

4. Rhizome short, stout and erect. Indusia 1 to 2·2 mm. in diam. *L. killipii* 2.

4.* Rhizome shortly creeping. Indusia 0·5 to 1 mm. in diam. *L. amplissima* 3.

2.* Lamina catadromous at the base only. Axes clothed with bulbous-based, bristle-like scales .. .. *L. hispida* 4.

1.* Scales of the rhizome entire, fimbriate or occasionally with a few teeth. Upper surface of the rhachises with various types of septate hairs. Axes sometimes clothed with few to many scales which are entire or almost so. Fronds catadromous throughout or at the base. Spores ruguloso-saccate, cristate or rarely echinate. Indusia orbicular-reniform or sometimes reniform, absent in some species. Gemmiferous bulbils present on the rhachises in some species.

5. Upper surface of the secondary rhachises and costae glabrous except for a few, scattered scales and *Ctenitis*-hairs.

6. Apices of the ultimate segments subacute or acute. Main rhachis without a gemmiferous bulbil near the apex .. .. *L. vieillardii* 5.

6.* Apices of the ultimate segments sharply acute to apiculate. Main rhachis with a gemmiferous bulbil near the apex .. .. *L. acuta* 6.

5.* Upper surface of the secondary rhachises and costae densely tomentose or villous.

7. Sori oblong. Main rhachis normally with gemmiferous bulbils. Rhizome prostrate .. .. *L. subsimilis* 7.

7.* Sori orbicular or slightly oblong at maturity in *L. currori* ssp. *eglandulosa*.

8. Rhizome erect or oblique, tufted, unbranched.

9. Main rhachis normally with scaly gemmiferous bulbils. African species.

10. Secondary rhachises villous on the lower surface especially towards the base. Sori indusiate.. .. .. *L. nigritiana* 8.

10.* Secondary rhachises glabrous or sparsely tomentellous on the lower surface. Sori indusiate or exindusiate.

11. Indusia present, rather fugacious and shrivelled when old. Sori 0·5 to 1·2 mm. in diam., rarely up to 2 mm. in eglandulose specimens .. .. .. *L. currori* 9.

11.* Indusia absent. Sori 1 to 1·8 mm. in diam. *L. vogelii* 10.

9.* Main rhachis always without gemmiferous bulbils. African, Indonesian, Australian and New Zealand species.

12. Lamina and stipes densely villous with white, spreading, acicular hairs 0·5 to 2 mm. long. Sori exindusiate. *L. barterana* 11.

12.* Lamina and stipes densely villous with brownish hairs 0·2 to 0·5 mm. long, pubescent or more or less glabrous. Sori indusiate.

13. Lamina densely villous between the veins with brownish hairs 0·2 to 0·5 mm. long. Indusia mostly densely clothed with numerous, yellow or orange glands *L. velutina* 12.

13.* Lamina without septate hairs or with a few, scattered *Ctenitis*-hairs between the veins. Indusia glabrous or with 1 or 2 glands.

14. Primary pinnae catadromous throughout or rarely the apical 1 or 2 pairs anadromous.

15. Secondary rhachises, costae and costules pubescent with numerous, spreading, brownish hairs with red articulations .. *L. boivinii* 13.

15.* Secondary rhachises, costae and costules glabrous or with a few, 2-celled, glandular-tipped hairs and a few, lax, 5- to 6-celled *Ctenitis*-hairs .. .. .. *L. hornei* 14.

14.* Primary pinnae catadromous at the base and rarely the middle, otherwise anadromous.

16. Margin of the ultimate segments crenate or dentate. Glands absent except on the pedicels of the sporangia. Fronds coriaceous, 3-pinnate to 3-pinnate-pinnatifid .. *L. subsparsa* 15.

16.* Margin of the ultimate segments spinulose-dentate. Glands scattered along the rhachises, costae, costules and the surface of the lamina, also on the pedicels of the sporangia. Fronds submembranous to very thinly subcoriaceous.

17. Lower surface of the main rhachis with long, spreading hairs especially in the apical and middle portions. Fronds 2- to 3-pinnate, pale green .. *L. shepherdii* 16.

17.* Lower surface of the main rhachis almost glabrous or with a few, fine hairs. Fronds 3-pinnate-pinnatifid to 4-pinnate, dark green.

18. Tertiary segments of the lamina 1 to 3 mm. broad .. .. *L. glabella* 17.

18.* Tertiary segments of the lamina 4 to 8 mm. broad .. .. *L. smithiana* 18.

8.* Rhizome shortly creeping or long-creeping, sometimes branched.

19. Sori exindusiate. Main rhachis sometimes with gemmiferous bulbils in one American species.

20. Secondary rhachises with a narrow, even wing of lamina. Main rhachis often with 1 or 2 gemmiferous bulbils. An American species .. .. *L. effusa* 19.

20.* Secondary rhachises not evenly winged. Main rhachis without gemmiferous bulbils. Asiatic, Australian and New Caledonian species.

21. Lamina and veins pilose. Fronds eglandulose or a few red glands on the costae and pedicels of the sporangia.

22. Sori terminal on the veinlets .. *L. subrecedens* 20.

22.* Sori mostly medial but sometimes supramedial on simple veinlets or medial to almost terminal on the acroscopic branchlets of forked veinlets, rarely on the fork .. .. *L. wurunuran* 21.

21.* Lamina and veins never pilose. Fronds clothed with numerous glands.

23. Margin of the secondary pinnae aristate, the teeth extending from the apices almost to the base. Upper surface of the lamina very glossy .. *L. munita* 22.

23.* Margin of the secondary pinnae crenulate to aristate, the teeth confined to the apices. Upper surface of the lamina dull to glossy .. *L. rufescens* 23.

19.* Sori indusiate. Main rhachis with gemmiferous bulbils in one American species.

24. Spores echinate, never alate. Sori borne on the margin of the ultimate segments .. .. .. *L. subsericea* 24.

24.* Spores ruguloso-saccate or cristate.

25. Lamina markedly catadromous. Rhachises with small, scattered, often bullate, dark brown scales.

26. Mature indusia black or almost so. Sori in a submarginal row on the ultimate segments. Glands often round, sometimes oblong.

27. Lamina coriaceous, very glossy on the upper surface, lacking whitish hairs between the veins. Ultimate segments ovate-deltoid, each with a sharp apical tooth .. *L. marginans* 25.

27.* Lamina herbaceous, dull on the upper surface, clothed with soft, short, white hairs between the veins. Ultimate segments oblong, the apices acute or with several, rather obtuse or acute short teeth .. .. .. *L. tenera* 26.

26.* Mature indusia brown, light or sometimes dark brown. Sori medial to submarginal but not in a submarginal row. Glands mostly oblong.

28. Apices of the ultimate segments acuminate, apiculate or mucronate .. *L. decomposita* 27.

28.* Apices of the ultimate segments obtuse or broadly rounded, often slightly crenate .. .. *L. silvestris* 28.

25.* Lamina catadromous at the base, anadromous towards the apices of the primary pinnae.

29. Gemmiferous bulbils normally present towards the apices of the main rhachises. Tufts of long hairs absent at the junctions of the secondary rhachises with the main rhachis and the costae .. .. *L. exculta* 29.

29.* Gemmiferous bulbils always absent. Tufts of long hairs often present at the junctions of the secondary rhachises with the main rhachis and costae.

30. Margin of the ultimate segments spinulose-dentate especially towards the apex or rarely almost crenate. Apices of the tertiary laminal segments broadly rounded to obtuse. Sori medial to submarginal.

31. Lower surface of the main rhachis very glossy and glabrous except for a few, 4- to 6-celled *Ctenitis*-hairs; dense tufts of hairs at the junctions of the secondary rhachises with the main rhachis. Indusia persistent, 0·5 to 1·5 mm. in diam. .. .. *L. calantha* 30.

31.* Lower surface of the main rhachis dull or slightly glossy, often minutely and densely pubescent, or if sparsely pubescent then without tufts of hairs at the junctions of the secondary rhachises with the main rhachis.

32. Hairs of the lower surface of the secondary rhachises stiff, 2- to 3-celled and reddish. Indusium vestigial, 0·4 to 0·8 mm. in diam., covering only the centre of the sorus at maturity .. .. .. *L. pacifica* 31.

32.* Hairs of the lower surface of the secondary rhachises 4- to 9-celled, acute and whitish. Indusium 0·5 to 1·5 mm. in diam., covering the greater part of each sorus at maturity .. .. *L. microsora* 32.

30.* Margin of the ultimate segments obliquely crenate except in specimens where the sori are found on narrow marginal projections. Apices of the tertiary laminal segments usually apiculate, acute or sometimes subacute. Indusia large, persistent, 0·8 to 1 mm. in diam. Sori medial to marginal *L. nephrodioides* 33.

ENUMERATION OF THE SPECIES

1. **Lastreopsis davallioides** (*Brack.*) *Tindale* in Vict. Nat. LXXIII (1957) 184.

Habitat in tropical mountain rainforests, sometimes in mossy forests, terrestrial or sometimes epiphytic. *Rhizome* long-creeping, ca. 1 to 1.3 cm. broad, very densely clothed with scales which are persistent, dark brown or rich golden-brown, castaneous when young, caudate to hair-pointed, firm, linear, 0·3 to 0·5 mm. broad, 0·7 to 2 cm. long, the lumina golden or yellow-brown, the margin with a few, hooked teeth especially towards the apex. *Stipes* widely spaced, ca. 2 to 3 cm. apart on the rhizome, ca. 50 to 55 cm. long, 2 to 4 mm. broad near the middle, light brown or castaneous, dark brown towards the base, slightly mottled, not winged, the lower surface glossy or dull, smooth except near the base, grooved on the upper surface, slightly tomentose towards the apex in the channel, the base of the stipes clothed with similar scales to those on the rhizome. *Main rhachis* unwinged except at the extreme tip, light brown or castaneous, slightly mottled, the lower surface dull or glossy, smooth or slightly scabrous, clothed with a few, dark brown, sparsely denticulate or entire, fibrillose, cordate-based scales, the raised portion on the upper surface and the channel between the 2 ridges very densely clothed with obtuse, 1- to 4-celled, club-shaped *Ctenitis*-hairs which mostly have red, glandular apices; gemmiferous buds absent. *Fronds* including the stipes usually 60 to 90 cm. long. *Lamina* about 30 to 60 cm. long, 23 to 30 cm. broad, 4-pinnate-pinnatifid to 5-pinnate, anadromous, brownish-green in dried specimens, paler on the lower surface, papyraceous, slightly glossy above, quinquangular, the surface with a few, yellow or orange, glandular hairs, the apex acuminate. *Primary pinnae* 6 to 12 pairs, the petiolules not winged, up to 4·5 cm. long, very widely spaced on the main rhachis, the basal pair much enlarged, 20 to 40 cm. long, 14 to 25 cm. broad, 14- to 18-jugate, obliquely broadly ovate (6: 5) to ovate (3: 2), the apex caudate. *Secondary rhachises* similar to the main rhachis. *Secondary pinnae* with petiolules up to 2.3 cm. long, not winged in the basal and middle pairs, anadromous, the lowest pair 12 to 18 cm. long, 6 to 14 cm. broad, obliquely narrowly ovate (2: 1) to broadly ovate (6: 5), the apex acuminate. *Tertiary pinnae* with petiolules up to 1 cm. long, winged except in the basal pairs, 8- to 11-jugate, up to 10 cm. long and up to 5 cm. broad. obliquely lanceolate (3: 1) to narrowly ovate (2: 1), the apex shortly acuminate, *Quaternary pinnae* with winged petiolules or slightly constricted at the base in the upper pairs, obliquely lanceolate (3: 1), up to 3·5 cm. long and 1·3 cm. broad, the apex acute. *Ultimate segments* with winged petiolules, up to 1 cm. long and up to 0·4 mm. broad, obliquely lanceolate (3: 1) to narrowly ovate (2: 1), deeply dissected into acute teeth. *Veins* free, pinnate, simple or forked in the ultimate segments, not reaching the margin, the lower surface of the costae, costules and minor veinlets usually densely clothed with yellow or orange, oblong, glandular hairs and small, entire or sparsely denticulate, subclathrate, brown, bullate, fimbriate-based scales which often have glands along the margins, the upper surface of the costae, costules and often the minor veinlets clothed with glandular-tipped, usually 1- or 2-celled, club-shaped *Ctenitis*-hairs. *Sori* indusiate, borne near the base of the teeth, towards the middle or apex of simple veinlets, orbicular, numerous, 0·5 to 1·2 mm. in diam. *Indusium* orbicular-reniform with a closed sinus, firm, entire, dark brown or brown with a darker centre, fairly persistent, ca. 1 mm. in diam., glabrous or with a few, yellow or orange, glandular hairs especially towards the centre. *Sporangia* with a narrow, elongated pedicel bearing a yellow or orange, glandular hair, the annulus composed of 14 to 17 indurated cells and about 6 to 7 thin-walled cells including a lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, brown, echinulate, equat. diam. 35·63 to 56·25 μ × polar diam. 20·63 to 37·5 μ, with an almost unbroken wing 3·75 to 11·25 μ in diam. *Glandular hairs* oblong, appressed, sessile, unicellular, yellow or orange, densely to sparsely scattered along the lower surface of the rhachises, costae, costules, minor veinlets, lamina and often the indusia, rarely occurring on the upper surface. (Plate XV, f.3).

Distribution: Tahiti, Samoa, Fiji and the New Hebrides.

Holotype: Tahiti, No. 19, U.S. South Pacific Exploring Expedition, under the command of Capt. Wilkes, 1838-42 (US 56405-6), examined. This specimen which is located in the Smithsonian Institution, is a good match for NSW P7528 collected at Afiamalu, Samoa, by McKee No. 2976 in August 1955.

Specimens Examined:—*Fiji:* Nandarivatu, Cheel 7.1918 (NSW P7530); Mount Mbuke Levu, Kandavu Island, 750-840 m. alt., summit, dense forest, A.C. Smith No. 275, 25.10.1933 (US 1657836).

New Hebrides: Aneityum, Gunn 1915 (NSW P7529).

Samoa: Upolu, on trees (?), Betche No. 91, 5.1880 (NSW P7531); Afiamalu, above Malololelei, Upolu, 600 m. alt., terrestrial in wet mossy forest on plateau, McKee No. 2976, 8.1955 (NSW P7528); Upolu, in silvis primaevis alte in arbores scandens in monte Lanutoo, ca. 700 m., Rechinger 8.1905 (US 1668591); above Matavanu, Island of Savaii, wet forest, epiphyte, alt. 1,300 m., Christophersen & Hume No. 2165, 7.1931 (US 1919579); Savaii, Graffe (US 269564); Ost Upolu, am Fao, Reinecke No. 97a, 5.1894 (US 341857); Upolu, Lepua, Reinecke 5.1895 (US 341976 and BO 102286); 900 m. alt., Vaupel No. 336, 1905 (US 1507701; US 1507702); Upolu, Malololelei-Lanutoo trail forest, alt. 700 m., herb 0·5 m. high, Christophersen No. 362, 21-22.8.1929 (US 1919516); Upolu, Kammgebiet, Reinecke No. 59, 1.1897 (BO 102283); Upolu, Lanutoogebiet, Reinecke No. 111, 5.1894 (BO 102284); Upolu, Centralkamm, 700 m. alt., Reinecke No. 125, (BO 102285).

Absolute Synonyms: *Lastrea davallioides* Brack., U.S. Expl. Exp. XVI (1854) 202; *Dryopteris davallioides* (Brack.) O. Ktze., Rev. Gen. Pl. II (1891) 812; Copel., in Bish. Mus. Bull. No. 59 (1929) 44 and No. 93 (1932) 34, pl. 6; C. Chr. in Bish. Mus. Bull. No. 177 (1943) 97; *Parapolystichum davallioides* (Brack.) Ching in Sunyatsenia V (1940) 239; *Ctenitis davallioides* (Brack.) Copel. in Journ. Arn. Arb. XXX (1949) 437.

Equivalent Synonyms: *Dryopteris microtricha* Copel. in Bish. Mus. Bull. No. 59 (1929) 10, 44, Isotype: Viti Levu, Voma Mountain, Fiji, near the summit, alt. 900 m., J. W. Gillespie No. 2742, 1927 (BISH), examined. The rhizome and the basal scales of the stipe are missing in this isotype but it is clearly the same species as *Lastreopsis davallioides; Ctenitis microtricha* (Copel.) Copel. in Gen. Fil. (1947) 124.

In Journ. Arn. Arb. XXX (1949) 437, Copeland stated that " Without yet feeling certain, I agree with Christensen (in Bish. Mus. Bull. No. 177 (1943) 97) that my *Dryopteris microtricha* is probably a synonym of *Lastrea davallioides.* I am also uncertain as to the proper genus for this plant. By its pubescence it seems to be a *Ctenitis* but the anadromic dissection of the frond indicates *Rumohra.*"

2. Lastreopsis killipii (*C. Chr. et Maxon*) *Tindale* in Vict. Nat. LXXIII (1957) 185.

The following is the original description cited by Christensen and Maxon in Amer. Fern Journ. XVIII (1928) 4:—

" Rhizome short, stout, ascending, densely paleaceous, the scales suberect, tufted, bright brown, narrowly subulate-attenuate, 1-2 cm. long, rather thin, mostly involute or twisted, denticulate. Fronds 4 or 5, subfasciculate, suberect, about 2 meters long, the stipes slightly longer than the blades, stout, yellowish-brown, lustrous, strongly paleaceous, the scales persistent, rufous-brownish, thin, lanceolate, hair-pointed, denticulate-fimbriate, the larger ones divergent, underlaid by numerous smaller, thinner, peltately affixed, appressed scales, a similar covering of hairlike scales extending to all the rachises and to the costules and veins of the ultimate segments beneath; blades deltoid, acute, up to 1 meter long and 90 cm. broad, 4- pinnate-pinnatifid, the pinnae spreading; basal pinnae deltoid, acuminate, 45 cm. long, 30 cm. broad, stalked (5 cm.), inequilateral though not strongly basiscopic, the proximal basal pinnule subdeltoid, 15-17 cm. long, 10 cm. broad, stalked (1·5-1·8 cm.), long-acuminate; pinnules of the third order ovate-oblong to triangular-oblong, acuminate, the larger ones 4-6 cm. long, 1-2 cm. broad, stalked (2-5 mm.); larger pinnules of the fourth order 10-15 mm. long, rather obtuse, obliquely incised nearly to the costa into 4 or 5 pairs of acutish ultimate segments, the larger of these often sharply toothed distally; basal pinnules of all orders nearly opposite, the upper ones alternate, those of the third and fourth orders inequilateral at base, the distal divisions elongate; costae and costules densely puberulous above with short brown intestiniform hairs, the upper leaf surface glabrous; under side of segments beset with very minute, thick, lustrous, yellow, glandlike hairs, freely so along the veins; sori few, distant, nearly confined to the distal side of the ultimate divisions, dorsal, the usually simple veinlet not attaining the apex of the sharply acute lobe; sporangia numerous, bearing a short-stalked yellow gland upon the pedicel; indusia large, coriaceous, roundish-reniform, glabrous, subpeltate. Leaf tissue firmly membrano-herbaceous, brownish when drying."

DISTRIBUTION: Panama, Colombia and Costa Rica.

HOLOTYPE: In humid forest of the Rio Caldera watershed, W of El Boquete, Chiriquí, Panama, 1900 m. alt., Ellsworth P. Killip No. 5360, 17-19.2.1917 (US 1207594), examined.

SPECIMENS EXAMINED:—*Costa Rica:* Santa Clara de Cartago, 1950 m. alt., Maxon No. 8222 (US).

Panama: Chiriquí, Killip No. 5293 (US).

Colombia: Departamento del Huila, Cordillera Oriental, vertiente occidental, entre Gabinete y Andalucia, 2200-2300 m. alt., Cuatrecasas No. 8679, 3.1940 (US 1850705).

ABSOLUTE SYNONYMS: *Dryopteris killipii* C. Chr. et Maxon in Amer. Fern Journ. XVIII (1928) 4-5; *Parapolystichum killipii* (C. Chr. et Maxon) Ching in Sunyatsenia V (1940) 239.

The following data was not incorporated in Christensen's and Maxon's original description of this species:— *Lamina* anadromous throughout. *Main* and *secondary rhachises* clothed on the upper surface with club-shaped, 1- to 4-celled, red-brown hairs similar to those of *L. hispida*, *L. amplissima* and *L. davallioides*. *Indusium* 1 to 2·2 mm. *Sporangia* with an annulus composed of 15 to 17 indurated cells and about 8 thin-walled cells. *Spores* bilateral, monolete, globose-ellipsoidal to almost globose, the perispore being brown with darker brown, often reticulating crests, equat. diam. 41·25 to 50·63 μ × polar diam. 31·88 to 37·5 μ, with a very finely echinulate wing 3·75 to 7·5 μ in diam.

The rhachises and stipes of *L. killipii* are very densely paleaceous but this is often also the case in *L. amplissima* which is closely related to the former species.

3. **Lastreopsis amplissima** (*Presl*) *Tindale* in Vict. Nat. LXXIII (1957) 185.

Christensen's description of this species in his Monograph of the Genus *Dryopteris* is cited below:—

" Rhizome shortly creeping, 1 to 2 cm. thick, densely coated with clathrate, dark brown or reddish-brown, glossy, narrow, lanceolate-acuminate scales that are sharply toothed, often with claw-shaped teeth. Stipites rather close, strong, fuscous or castaneous, up to 50 cm. long, towards the base densely, upwards more sparsely paleaceous with similar scales. Lamina deltoid-ovate, probably up to one meter high and nearly as wide at base, coriaceous, brownish when dried, the rachises and midribs glanduloso-pubescent above, sometimes with some yellowish cylindrical glands beneath, otherwise without hairs, but rachises I-IV beneath with several, often many near the axils, rather deciduous, lanceolate, toothed, red-brown scales, 4-pinnate-5-pinnatifid. Pinnae and pinnules ovate-oblong, somewhat unequal-sided, the anterior side wider that the posterior one, most so at base; lower side of basal pinnae produced; rachises II-III not winged. Quaternary pinnules or segments of middle pinnae oblong, obtuse, rarely 5 mm. broad, more or less deeply lobed with 3-4 falcate, obtuse or subfalcate lobes on each side; each ultimate lobe (of V. order) bears a sorus. Indusia dark brown, subpersistent, glabrous, subreniform or almost subpeltate. Sporangia glabrous; spores minutely and densely papillose." (Plate XV, f. 1).

DISTRIBUTION: South America (Brazil, Paraguay and Bolivia).

HOLOTYPE: South Brazil, Sellow and Beyrich (isotype B), not examined.

SPECIMENS EXAMINED: *Brazil:* Serra do Mar, Ypiranga, in silva primaeva, Dusén 9.1908 (US 1340140); Iguape, State of São Paulo, Brade No. 8277, 3.1924 (US 1498899-1498900); Theresopolis, Serra dos Orgãos, im Wald, Schenck No. 2599, 2.1887 (NSW).

Bolivia: Polo-Polo bei Coroico, Nordyungas, 1000 m. above sea level, región subtropical, Buchtien No. 3377, 10-11.1912 (NSW P8453).

ABSOLUTE SYNONYMS: *Polystichum amplissimum* Pr., Tent. Pterid. (1836) 84, nomen nud.; Presl, Epim. Bot. (1851) 58; *Aspidium amplissimum* Mett., Aspid. (1858) 68; *Nephrodium amplissimum* Hook., Sp. Fil. IV (1862) 145; *Dryopteris amplissima* (Pr.) O. Ktze., Rev. Gen. Pl. II (1891) 812; C. Chr., Monogr. Dry. II (1919) 1920, 110; *Rumohra amplissima* (Pr.) Copel., Gen. Fil. (1947) 114; *Polystichopsis amplissima* (Pr.) Abbiatti in Rev. Mus. de la Plata, IX, Bot. No. 37 (1958) 19.

In Monogr. of the Genus *Dryopteris* II (1919), 1920, 111, Christensen has cited a much fuller list of synonyms but I have not seen the types of these taxa.

The following features which I have observed, may be added to Christensen's description of the type variety:— *Rhachises* glanduloso-pubescent on the raised portion and channel between the two ridges on the upper surfaces, these hairs being brown or reddish, club-shaped, 1- to 4-celled, the lower surface of the rhachises clothed with dark or light brown, more or less lanceolate scales with yellow lumina and marginal hooked teeth extending from the acuminate apex to the broad base. *Lamina* markedly anadromous, the leaf-margin thickened. *Tertiary rhachises* and *costae* clothed on the lower surface with clavate, 1-celled, pale yellow or orange, glandular hairs. *Veins* anadromous, not reaching the margin, the minor veinlets free, simple, forked or pinnate in the ultimate segments. *Sporangia* with an annulus composed of 14 to 16 indurated cells and about 6 thin-walled cells. *Spores* bilateral, monolete, globose-ellipsoidal, black, cristate, the crests echinulate or minutely papillose, the narrow papillae slightly hooked, the crests sometimes extending half-way around a spore or surrounding it, equat. diam. 46·88 to 52·5 μ × polar diam. 30 to 34·38 μ, the wing 5·63 to 7·5 μ.

Christensen also segregated *Dryopteris amplissima* var. *phaeochlamys* (Fée) C. Chr. in his Monogr. Dry. II (1919), 1920, 112. This variety has less dissected fronds which are 3-pinnate to 4-pinnatifid. It is said to be a form from drier regions, occurring in Brazil and Paraguay. I have examined two specimens of this variety, viz. an isotype of *Aspidium macrum* Fée (Rio de Janeiro, Brazil, Glaziou No. 2390, US 532129) and an isotype of *Aspidium phaeochlamys* Fée (Rio de Janeiro, Glaziou No. 1782 (US 532120)). In Rev. Mus. de la Plata IX, Bot. No. 37 (1958) 19, Abbiatti published a new combination *Polystichopsis amplissima* (Pr.) Abbiatti. There is a photograph of the transverse section of a stipe in l.c. Pl. III, f. 4.

Christensen also segregated *D. amplissima* var. *subeffusa* C. Chr. (l.c. 112), based on British Guiana, Mt. Roraima Expedition, im Thurn No. 354, 21.12.1884 (W). I have examined an isotype of the latter (US 50884), as well as a more recently collected specimen labelled Venezuela, State of Bolívar, Mt. Roraima, southwest facing forested slopes between Rondón Camp and base of sandstone bluffs, alt. 2040-2255 m., Steyermark No. 58966, 9.1944 (US 1915113-4). This variety is characterized by the secondary and tertiary rhachises being evenly winged as in *L. effusa* but it is anadromous as in *L. amplissima.* However I have not examined sufficient material of these two varieties to transfer them to *L. amplissima* as subspecies.

4. **Lastreopsis hispida** (*Sw.*) *Tindale* in Vict. Nat. LXXIII (1957) 183; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 62, pl. IX, f. 4, 6 and 7; J. H. Willis, Handb. Fl. Vict. (1962) 40; Crookes & Dobbie, N.Z. Ferns (1963) 250, pl. 251.

Habitat terrestrial in subtropical or temperate rainforests. *Rhizome* long-creeping, about 5 to 8 mm. in diam., densely clothed with scales which are golden-brown or dark red-brown, hair-pointed, glossy, firm, linear (more than 12: 1) to very narrowly lanceolate (more than 6: 1), 0·4 to 1 cm. long, usually 0·5 to 1 mm. broad, the central cells thick-walled, hexagonal to rectangular, elongated, the marginal cells flabelloid, with thinner, smaller cells, the lumina red-brown or deep yellow, the margin markedly denticulate with a few, oblong, marginal glands. *Stipes* rather crowded, 9·5 to 50 cm. long, 1 to 3 mm. broad near the middle, greyish-brown, red-brown or light to dark brown, not winged, glossy, muricate, 1-grooved on the upper surface (a continuation of the shallow groove on the main rhachis), pubescent throughout with minute, stiff, dark red-brown, glandular-tipped hairs a few of which are of the *Ctenitis*-type, the basal scales similar to those on the rhizome except that they are almost entire instead of markedly denticulate, densely clothed towards the middle and upper parts with scales which are spreading, bristle-like, rigid, long-acuminate or hair-pointed, entire, almost black, dark red or dark brown, linear (more than 12: 1) to very narrowly lanceolate (more than 6: 1), 2 to 10 mm. long, 0·1 to 0·4 mm. broad, with very prominent, persistent, bulbous bases. *Main* and *secondary rhachises* not winged except at the apex, without displaced pinnules, glossy, muricate below, the channel and raised median portion between the 2 ridges on the upper surface densely clothed with bristle-like scales and stiff, club-shaped, glandular-tipped, dark red-brown or whitish, usually 2-celled hairs with red articulations; gemmiferous bulbils absent. *Fronds* including the stipes 15 to 90 cm. long. *Lamina* 10 to 46 cm. long, 6 to 23 (rarely 30) cm. broad, 3- to 4-pinnate or sometimes 4-pinnate-pinnatifid at the base in large fronds, catadromous at the base, anadromous above, dark green when dried, dull, submembranous to subcoriaceous, quinquangular (2: 1 to 6: 5); apex acute to acuminate. *Primary pinnae* stalked, only the upper petiolules winged, the lower opposite, the upper alternate, the lower pinnae spreading, or all the pinnae erecto-patent, sometimes falcate, obliquely ovate to very broadly ovate, 6·5 to 13 cm. long, 5 to 9·5 cm. broad; apex more or less acuminate; basal pinnae the largest and basiscopically produced. *Secondary pinnae* stalked, the petiolules near the base of the primary pinnae not winged, the lowest pair 1·3 to 9·2 cm. long, 0·5 to 6 cm. broad, narrowly lanceolate-rhomboidal (6: 1) to ovate-rhomboidal (3: 2); apex acuminate. *Tertiary segments* anadromous or a few of those nearest the main rhachis catadromous or opposite. *Ultimate segments* constricted near the base, falcate, narrowly lanceolate-deltoid (6: 1) to ovate-deltoid (3: 2), narrowly oblong-lanceolate (3: 1) to cultrate-narrowly lanceolate (6: 1), 2 to 12 mm. long, 0·5 to 2 mm. broad, the apex mucronate, the margin thickened and with rather sharp, curved teeth. *Costae* and *costules* clothed with stiff, reddish, 2-celled, club-shaped, glandular-tipped hairs and a few, dark brown, entire, bristle-like scales also on the costae. *Veins* free, the minor veinlets from the midnerve of each ultimate pinnule usually simple, not reaching the margin. *Sori* indusiate, superficial, orbicular, copious, 0·5 to 1·2 mm. in diam., one on each ultimate lobe or segment, median on the veinlets or on their fork. *Indusium* about 0·5 to 1 mm. in diam., dark brown with an almost black disk, orbicular-subpeltate or reniform and attached by an indistinct, lateral sinus, persistent but shrivelled in the old condition, rather thick-textured, the margin glandular-fimbriate. *Sporangia* small, with a long pedicel bearing 1 or rarely 2 orange or dark yellow, stalked, oblong glands; annulus composed of about 13 to 16 indurated cells and about 6 to 8 thin-walled cells, the dehiscence lateral. *Spores* bilateral, monolete, globoso-ellipsoidal, the perispore light to dark brown, cristate, sometimes slightly reticulate, equat. diam. 41·3 to 60 $\mu \times$ polar diam. 30 to 46·88 μ including the almost uninterrupted wing which is 5·63 to 9·4 μ in diam., the surface of the perispore and the wing both finely echinulate. *Glandular hairs* oblong, appressed, unicellular, red, orange or yellow, scattered along the lower surface of the costae, costules, minor veinlets and lamina but more sparsely on the upper surfaces, also occurring on the indusia. (Plate IX, f. 4, 6, 7; Plate XV, f. 2).

* *Gametophyte:* " On germination a short filament is produced, sometimes only the basal cell remaining undivided; mature prothallus heart-shaped; numerous, small, unicellular, mucilaginous-capped hairs occurring on the margins, as well as the dorsal and ventral surfaces of the prothallus giving the latter a greyish appearance; antheridia usually borne on the ventral surface in the proximal region amongst the long, almost colourless rhizoids and on the thin cushion posterior to the archegonia; antheridia frequently very large but only having 3 wall-cells (on which hairs often occur), the basal and ring cells of which are usually very elongated; development of the antheridia the same as in *Blechnum nudum;* archegonia with 4 to 6 neck-cells ".

DISTRIBUTION: South Eastern Australia (Coast and Tablelands of New South Wales from the Blue Mountains southwards, Victoria and Tasmania), New Zealand and the Chatham Islands.

HOLOTYPE?: This is a specimen collected by Forster and is now located in the Palaeobotanical Department of the Riksmuseum, Stockholm, Sweden. A specimen collected by Gregson and Watts at Happy Valley, Mt. Wilson, in December 1914 (NSW P4660) is a good match for the type which was forwarded on loan to Sydney by courtesy of Prof. O. H. Selling.

SPECIMENS EXAMINED:—*Australia: New South Wales:* Waterfall Gully, Mt. Wilson, Gregson 2.1903 (NSW P3888 and P6103); Happy Valley, Mt. Wilson, Gregson & Watts 12.1914 (NSW P4660); Blue Mountains, Gregson 2.1903 (BO 102282).

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* The above description of the gametophyte was kindly contributed by Mrs. I. M. Stone (personal communication, previously unpublished).

Victoria: Mt. Juliet, near Burgoyne, Walter 5.1882 (NSW P3890); head of Emerald Creek, below Mernda Hill, Dandenong Ranges, Singleton 4.1942 (MEL); Healesville, St. John (MEL); head of the Bunyip River, Beenak, on wet granite gravel near the water's edge, Willis 1.1935 (MEL); Johanna River, near the Aire and Parker Rivers, Williams 12.1915 (NSW P4661); Cape Otway Ranges, Wilkinson (MEL).

Tasmania: south of Eldon Ranges, Hannaford (NSW P3891).

New Zealand: North Island: Waikowhai Park, Auckland, Hynes 3.1953 (AK 31490; NSW P8359); Bay of Plenty, Webb 12.1916 (NSW P6159); Wellington Province, near Waikane, 37 miles N of Wellington, in second-growth, nearly pure *Dysoxylum spectabile* forest, Walker No. 5178, 4.1949 (US 2015921); Boulder Hill, Hutt Valley, Wellington, Harris 1947 (CHR 64044; NSW P8360); in the neighbourhood of Wellington, Ralph No. 62, 1849-52 (US 418211); Muritai Bush (Eastbourne, on the eastern side of Wellington Harbour), in lowland bush, Dobbie 11.1930 (NSW P7869); Butterfly Creek (over the first ridge from Eastbourne), on leafy bank, Dobbie 12.1931 (NSW P7870). *South Island:* Greymouth, Westland, Kennedy 5.1919 (NSW P6144); Otira, Sulman 3.1913 (NSW P6160); Otago, Kershner 1.1875 (US 653616); Martin's Bay, Thomson 1883 (NSW P6145).

ABSOLUTE SYNONYMS: *Aspidium hispidum* Sw. in Schrad. Journ. Bot., II (1800), (1801) 39; *Polystichum hispidum* (Sw.) J. Sm. in Hook. Journ. Bot. IV (1841) 195; Maiden & Betche, Census N.S.W. Pl. (1916) 2; C. Chr. Ind. Fil. (1906) 582; Melvaine in Proc. Linn. Soc. N.S.W. LXI (1936) 118 (as *P. hispidium*); Harris in D.S.I.R. Bull. No. 116 (1955) 44, pl. 9, f. 8; *Lastrea hispida* (Sw.) Moore et Houlst. in Gard. Mag. Bot. III (1851) Ind. LXXXVIII; *Nephrodium hispidum* (Sw.) Hook., Sp. Fil. IV (1862) 150; *Dryopteris hispida* (Sw.) O. Ktze., Rev. Gen. Pl. II (1891) 813; C. Chr., Ind. Fil., Suppl. III (1934) 88; *Rumohra hispida* (Sw.) Copel., Gen. Fil. (1947) 114; Dobbie & Crookes, New Zealand Ferns (1952) 248; Allan, Fl. N.Z. I (1961) 92.

EQUIVALENT SYNONYMS: *Polypodium setosum* Forst. f., Prodr. (1786) 82, non Thunb. (1784). TYPE COLLECTION: No. 2851.447, New Zealand, ex G. Forster's Herbarium (BM); "Forsan e Nova Zelandia", Forster (UPS). The specimen at the British Museum of Natural History has no rhizome but the base of the stipe bears the characteristic bristle-like scales. A few sori are present on this frond which I have examined; *Polystichum schkuhrii* Presl, Tent. Pterid. (1836) 84, based on *Aspidium setosum* (Forst. f.) Schkuhr.

According to Dobbie & Crookes, New Zealand Ferns (1952) 248, *L. hispida* is a common species in lowland bush. It occurs on the North, South, Stewart and Chatham Islands. Harris in "Spores of New Zealand Pteridophyta", D.S.I.R. Bull. No. 116 (1955) 134, states that this species is frequent in lowland forest from sea-level to 2,000 ft. alt. However, *L. hispida* is rare and localized in Australia especially in New South Wales where it has only been recorded from Mt. Wilson in the Blue Mountains. J. H. Willis in Handb. Pl. Vict. (1962) 40, states that this species is "confined in Victoria to very shaded mountain fern gullies with abundant moisture and uncommon, growing both on wet gravelly soil and on mossy trunks or decayed logs usually under *Nothofagus* groves ....". In New Zealand the lamina reaches a greater size than in the Australian material, i.e. 23 to 46 cm. long and 15 to 30 cm. broad.

No count has so far been made of the chromosome number of Australian material of *L. hispida* but Brownlie has determined $n = 41$ in a specimen collected at North Westland, New Zealand, in Trans. Roy. Soc. N.Z. LXXXV (1958) 214.

5. **Lastreopsis vieillardii** (*Mett.*) *Tindale* in Vict. Nat. LXXIII (1957) 183.

Habitat terrestrial in tropical rainforests. *Rhizome* long-creeping, robust, 0·4 to 1·5 cm. broad, very densely clothed with scales which are persistent, bright brown, dull or slightly glossy, long-acuminate or hair-pointed, entire, not appressed, non-clathrate, becoming slightly woody, narrowly lanceolate (6: 1) to linear (12: 1), 4·5 to 12 mm. long, 0·5 to 1·5 mm. broad, the cells rectangular or hexagonal with yellow or brown lumina, the marginal cells with thinner walls. *Stipes* at intervals of 1 to 2 cm. apart on the rhizome, 52 to 67 cm. long, 2 to 4 mm. broad at the middle, dull, mostly scabrous, rarely smooth, fawn or light brown, darker towards the base, clothed towards the middle with scales which are dark brown, fibrillose, twisted, hair-pointed, entire, linear (12: 1 or more), 5 to 7 mm. long, 0·1 to 0·3 mm. broad and thick-walled; clothed towards the base with similar scales to those on the rhizome. *Main rhachis* winged towards the apex with the decurrent bases of the primary pinnae and also with the basal basiscopic leaflets of the primary pinnae displaced downwards onto the main rhachis in the upper half of the latter, fawn, smooth or slightly scabrous, often rather paleaceous especially near the junctions with the secondary rhachises, the lower surface bearing a few, scattered *Ctenitis*-hairs and oblong, yellow, glandular hairs, the raised central band glabrous on the upper surface and prominent in the upper part of the main rhachis with a wing formed by the decurrent bases of the pinnules, then with a very narrow channel on each side, so that the appearance is superficially different from other species of *Lastreopsis* except *L. acuta;* gemmiferous bulbils absent. *Fronds* 70 to 120 cm. long including the stipes. *Lamina* 24 to 62 cm. long, 19 to 40 cm. broad, 4-pinnate at the base, catadromous throughout or almost so, much darker green on the upper surface, drying a dull reddish-brown, subcoriaceous, quinquangular, tectarioid in appearance; apex acute to acuminate; margin very markedly thickened. *Primary pinnae* stalked, the lower petiolules not winged and 1 to 2·5 cm. long, the upper petiolules sessile, with a pinnule adnate to the main rhachis, distant, opposite or almost so, falcate or spreading, obliquely narrowly ovate (2: 1) to broadly ovate (6:5), 6- to 15-jugate; lowest pair 14 to 30 cm. long, 9 to 21 cm. broad, markedly basiscopically produced; apex acuminate. *Secondary pinnae* sessile except 1 or 2 on the lowest pair of primary pinnae, obliquely narrowly ovate-rhomboidal (2: 1) to lanceolate-rhomboidal (3: 1), 4 to 18 cm. long, 1·4 to 5·2 cm. broad on the lowest pair of primary pinnae, 9- to 17-jugate; apex acute or acuminate. *Tertiary segments* sessile except the lowest segment on the 2 lowest secondary pinnae of the basal primary pinnae, very oblique, narrowly oblong-rhomboidal (3: 1) to oblong-rhomboidal (2: 1), deeply dissected into obtuse lobes, 7- to 15-jugate; base broadly decurrent; basal segments 0·5 to 1·5 cm. long and 0·2 to 0·7 cm. broad. *Secondary rhachises* and *costae* clothed on both surfaces with a few *Ctenitis*-hairs and below with very dark brown, hair-pointed, entire, fibrillose, non-clathrate scales. *Veins* rather prominent, especially on the upper surface, free, forked, not reaching the margin, markedly catadromous or anadromous near the apexes of the primary pinnae, clothed on the lower surface of the minor veinlets with a few, appressed *Ctenitis*-hairs. *Sori* indusiate, orbicular, submarginal, medial on the minor veinlets or their branchlets. *Indusium* 0·5 to 1 mm. in diam., orbicular-reniform, fawn, membranous, rather persistent, glabrous towards the centre but a few, long *Ctenitis*-hairs on the periphery amongst the numerous, marginal, yellow, glandular hairs. *Sporangia* small, the pedicel long and slender with 1 or 2 stalked, oblong, yellow glands; annulus composed of 12 to 16 indurated cells and 7 to 9 thin-walled cells, with lateral dehiscence. *Spores* bilateral, monolete, globose-ellipsoidal, the perispore brown, slightly reticulate, equat. diam. 35·63 to 41·25 μ × polar diam. 28·13 to 37·5 μ, with a thin, dissected wing 3·75 to 7·5 μ broad. *Glandular hairs* shortly stalked, oblong, appressed, unicellular, bright yellow, scattered along the primary rhachis, the secondary rhachises, costae, costules, minor veinlets and lamina as well as along the margin of the indusia. (Plate XII).

DISTRIBUTION: New Caledonia.

HOLOTYPE: Balade, New Caledonia, Vieillard No. 1610-1604 (P). This holotype was kindly examined on my behalf by Mme. Tardieu-Blot.

Specimens Examined:—*New Caledonia:* Mt. Koghi, 350 m., Franc 1.1911, Rosenstock, Filices Novae Caledoniae exsicc. No. 22 (US 1096833); forested slope of Mt. Koghi, above l'Hermitage, 500 to 800 m. alt., terrestrial fern, McKee No. 3934, 2.1956 (NSW P7583; BM; L); Road to Hermitage, Nouméa district, 400 m. alt., in rainforest, terrestrial fern, McKee No. 2134, 2.1955 (NSW P7214; BM; SING); in sylvis montium Wagap, Vieillard No. 1610-1604 (NSW P7744; L 908338 . . . 531 and 908338 . . . 522); top of mountain, NE of Port St. Vincent, no collector nor date (NSW P7746); Auf den Bergen bei Oubatche, 1000 m. alt., Schlechter No. 15529, 12.1902 (NSW P7747; L 908140 . . . 1382; BO 102257); forêts du Col d'Amieu, Le Rat No. 2812, 1907 (BO 102258); Forêt du Koghi, 700 m. alt., Franc No. 351, 2.1909 (L 913335 . . . 499); Slope of Mt. Koghi, towards Vallée de Thy (St. Louis), terrestrial fern in forest, 400 to 500 m. alt., McKee No. 4711, 6.1956 (NSW P7776; K; US; UC; U); Yahoué, Franc No. 351, 10.1907 (L 908, 342 . . . 408); Mont Dzumac, 800 m. alt., Franc No. 351 Sér. B, 1907 (US 1091140; L 908, 342 . . . 496); sine locality, Franc No. 351 (US 1273205; NSW; SING).

Absolute Synonyms: *Aspidium vieillardii* Mett. in Ann. Sc. Nat., sér. 4, XV (1861) 75; *Nephrodium vieillardii* (Mett.) Bak., Syn. Fil. (1867) 282; *Dryopteris vieillardii* (Mett.) O. Ktze., Rev. Gen. Pl. II (1891) 814; C. Chr., Ind. Fil. (1905) 300.

This species which is endemic to New Caledonia, is found in the tropical rainforests on the mountain slopes. The fronds of *L. vieillardii* have a superficial resemblance to those of *Tectaria*, especially to *T. stearnsii* Maxon, of Samoa, but the veins of the latter are slightly anastomosing instead of free and forked as in *Lastreopsis*. The ridges of the upper surface of the secondary rhachises in *T. stearnsii* are not continuous with the edge of the pinnules as in *L. vieillardii*.

L. vieillardii looks different from most other species of this genus, because the raised central portion of the channel on the upper surface of the main rhachis is glabrous instead of densely clothed with *Ctenitis*-hairs or other hairs.

It is not closely related to any of the other 3 species of *Lastreopsis* occurring in New Caledonia, viz. *L. tenera*, *L. rufescens* and *L. subsericea*. The last-named species is also endemic to this country, whereas the other 2 species have a very wide range.

A chromosome count of $n = 41$ has been made by G. Brownlie on material of *L. vieillardii* collected at Mt. Koghi, New Caledonia (in press in ' Pacific Science ', personal communication by G. Brownlie).

6. Lastreopsis acuta (*Hook.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1963) 245.

The following is the original description cited by C. Christensen in Monogr. Gen. *Dryopteris* II (1919) 1920, 94:—

" Rhizome creeping 6-8 mm. thick, paleaceous; scales lanceolate, entire, scarcely more than 1 mm. broad. Stipe brownish-stramineous with several small, deciduous scales like (the) rhachis which produces a bud below the apex. Lamina probably more than one meter high, firm, nearly coriaceous, glossy above, quadripinnatifid at base, tripinnatifid at the middle, in cutting agreeing with *D. effusa* (i.e. *Lastreopsis effusa*). Basal pinnae the largest, much produced downwards, long-stalked; middle pinnae up to 35 cm. long, lanceolate, acuminated with a serrated, sharply acute apex. Pinnulae distant, lanceolate, acuminate-mucronate, shortly narrowed towards the base, decurrent, pinnatifid about 2/3 of the way down into falcate, sharply acute, close segments, the larger of which are obliquely toothed, the posterior basal one reduced, and broadly adnate-decurrent to the costa. Rachises rather scaly by small, lanceolate, brown, entire scales. Upper surface, incl. costae and costulae, quite glabrous, underside with scattered, as fresh bright-yellow short and thick cylindrical hairs. Veins simple, oblique. Sori a little supramedial. Indusia rather deciduous, reniform, with many yellow, cylindrical hairs." (Plate XIII).

DISTRIBUTION: Brazil, South America. According to Christensen in Monograph of the Genus *Dryopteris*, II (1919) 1920, 95, this species is "apparently rare and perhaps confined to the north-eastern provinces of Brazil".

HOLOTYPE: Brazil, Sellow (K), not seen. ISOTYPE: Campos Vittoria, Brazil, Sellow No. 7332 (BM), examined.

SPECIMENS EXAMINED:— *Brazil:* Parahyba, Goeldi, Herb. Christensen No. 2872 (BM); Glaziou No. 15758 (K; B).

ABSOLUTE SYNONYMS: *Nephrodium acutum* Hook., Sp. Fil. IV (1862) 147 partim (excl. tab. 271); Hook. & Bak., Syn. Fil. (1868) 286; *Dryopteris acuta* (Hook.) O. Ktze., Rev. Gen. Pl. II (1891) 812; C. Chr., Monogr. *Dryopteris* II (1919) 1920, 94-5, f. 20.

The following characteristics of *L. acuta* may be added to Christensen's description in his Monograph of *Dryopteris* II (1919) 1920, 94-5:— *Sporangia* with an annulus which includes 13 to 15 indurated cells, the pedicels with or without oblong, golden, glandular hairs. *Spores* bilateral, monolete, globose-ellipsoidal, light brown with a few, dark brown crests, equat. diam. 30 to 39·38 μ × polar diam. 22·5 to 28·13 μ, the wing relatively undissected, 1·88 to 5·63 μ.

Only 3 specimens were available for examination but the rhizome was missing in all of them. There is a proliferous bulbil near the apex of the main rhachis in the frond collected by Goeldi at Parahyba, north-eastern Brazil. These bulbils are also present in 2 other American species, viz. *L. effusa* and *L. exculta*.

The sharply acute to apiculate apices of the ultimate segments are the most distinctive characteristic of *L. acuta*. The main and secondary rhachises are densely clothed with scales which are dark brown, acuminate, appressed, entire or slightly denticulate near the base. As in *L. vieillardii* of New Caledonia, the basiscopic tertiary segments of the middle primary pinnae are adnate to the secondary rhachises and are markedly decurrent along them. The fronds of *L. acuta* are dark green and subcoriaceous with orbicular sori borne towards the apices of the minor veinlets. The sori appear to be slightly closer to the margin than the midrib. The indusia are dark brown and cordato-reniform with numerous, oblong, yellow, glandular hairs on the surface and margin.

7. Lastreopsis subsimilis (*Hook.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1963) 245.

Habitat terrestrial in tropical rainforests. *Rhizome* shortly creeping, prostrate, ca. 2 cm. in diam., bearing numerous, strong roots, also densely clothed with scales which are acuminate, linear (12: 1), dark brown or golden-brown, slightly glossy, thin, up to 1·2 cm. long, ca. 1 mm. broad at the base, the lumina yellow or golden-brown, the margin entire or more usually with a few, long, often glandular-headed processes especially towards the base. *Stipes* erect, crowded, 15 to 50 cm. long, 2 to 3 mm. broad near the middle, light brown, darker towards the base, glossy, slightly scabrous or smooth, grooved above, towards the apex with a broad channel clothed with a dense tomentum of short, brownish *Ctenitis*-hairs, glabrous on the lower surface, clothed near the base with similar scales to those on the stipes. *Main rhachis* not winged except near the apex, glossy, light brown or stramineous, the lower surface glabrous except near the junctions of the primary pinnae which are clothed with short, brownish *Ctenitis*-hairs and a few, fibrillose, subfimbriate, dark brown scales, densely tomentose on the upper surface of the raised median band in the broad shallow channel with 2- to 4-celled, brownish *Ctenitis*-hairs; often gemmiferous with scaly buds near the apex. *Fronds* ca. 55 to 85 cm. long including the stipes. *Lamina* 2-pinnate, 2-pinnate-pinnatifid to 3-pinnate, catadromous at the base only, dark green and glossy above, slightly paler beneath, quinquangular, subcoriaceous or herbaceous, 36 to 75 cm. long, 25 to 45 cm. broad, the lower surface clothed with a few, scattered, appressed, 2- or 3-celled *Ctenitis*-hairs between the veins especially near the sinuses and along the margins, the upper surface glabrous, the apex acuminate. *Primary pinnae* with petiolules up to 1·2 cm. long and not winged in the upper pairs, obliquely narrowly ovate (2: 1) to broadly ovate (6: 5), the lowest pair basiscopically produced and much enlarged, 23 to 38 cm. long, 12 to 17 cm. broad, the apex acuminate. *Secondary pinnae* with winged petiolules, divided at the base of the largest pinnae into stalked segments, otherwise lobed half-way to the midrib in the middle pinnae or crenately lobed in the upper pinnae, the basal basiscopic pair the largest, slightly obliquely narrowly lanceolate (6: 1) to lanceolate (3: 1), 8 to 15 cm. long and 2·5 to 4·5 cm. broad, the apex shortly acuminate in some of the larger pairs, otherwise obtuse to broadly rounded. *Tertiary pinnae* stalked in the lower pairs, obliquely narrowly oblong (3:1) to oblong (2:1), 0·4 to 2 cm. long, 3 to 8 mm. broad, the apex broadly rounded, the margin crenate. *Secondary rhachises* mostly glabrous or clothed on the lower surface with a few, long, lax, 8- to 10-celled *Ctenitis*-hairs but the upper surface densely clothed with mostly obtuse, 2- to 4-celled, intestiniform hairs. *Veins* free, rather distant, the minor veinlets glabrous, pinnate in the ultimate segments, some not reaching the margin, the costae and costules glabrous or clothed very sparsely with 5- to 10-celled, unbranched *Ctenitis*-hairs on the lower surface, glabrous on the upper surface or clothed with obtuse, intestiniform, 2- or 3-celled hairs. *Sori* oblong, exindusiate, superficial, sometimes in a double row on the ultimate segments, borne near the base or middle of a veinlet or on its acroscopic branchlet or sometimes occurring on both branchlets. *Sporangia* with an annulus composed of 12 to 14 indurated cells and about 7 to 8 thin-walled cells including a lateral stomium, the long narrow pedicel sometimes with a stalked, oblong, yellow, glandular hair. *Spores* bilateral, globose-ellipsoidal, monolete, brown, sinuate-alate or almost ruguloso-saccate, equat. diam. 35·63 to 45 μ × polar diam. 33·75 to 37·5 μ, the wing 5·63 to 7·5 μ in diam. *Glandular hairs* (sometimes absent) sessile, appressed, yellow, occurring along the costae, costules and on the lower surface of the lamina. (Plate XIV).

Distribution: West Tropical Africa (Ivory Coast, Dahomey, Southern Nigeria, Cameroon, Fernando Po and Gabon) and the Malagasy Republic.

Holotype: Fernando Po, (plant) 3 to 4 ft. high, G. Mann No. 125, 12.1859 (K), examined.

Specimens Examined:—*Ivory Coast:* Nzida (cercle de Grand-Lahou), Plantation Lespesme, à terre dans la forêt, des Abbayes No. 1026, 8.1951 (US 2204024-6); 61 km. N of Sassandra, W of Niapidou, 6° 10′ W Long., 5° 19′ N Lat., alt. about 100 m., in rainforest, secondary forest on moist place, leaves shining and dark green above, slightly paler beneath, Leeuwenberg No. 2507, 1.1959 (K).

Nigeria: Usonigbe F. R., Benin, about 6 miles N of Urhehue, high forest of Observation Plot, terrestrial fern, with a short creeping rhizome, Keay F.H.I. No. 25587, 11.1949 (BM).

Cameroon: Victoria, Kalbreyer No. 14, 2 to 2½ ft. high, received 9·1877 (K; BM); Bipinde, Urwaldgebiet, Zenker No. 2567a, 1903 (BM).

Fernando Po: without specific locality, Mann 1860 (BM).

Gabon: Mayombe, Tchibanga, le Testu No. 1108, 8.1907 (BM).

Absolute Synonyms: *Gymnogramme subsimilis* Hook., Sp. Fil. V (1864) 142; *Phegopteris subsimilis* (Hook.) Mett. in Kühn, Fil. Afr. (1868) 123; *Dryopteris subsimilis* (Hook.) C. Chr., Ind. Fil. (1905) 296; *Ctenitis subsimilis* (Hook.) Tard. in Not. Syst. XIV (1952) 342; in Mém. I.F.A.N. XXVIII (1953) 137, t. 24, f. 1, 2; in Humbert, Fl. Madag., 5^{e} Fam., I (1958) 338; Alston, The Ferns & Fern-Allies West Trop. Africa (1959) 73.

EQUIVALENT SYNONYM: *Dryopteris bicolor* Bonap. in Not. Ptérid. XIV (1924) 204, HOLOTYPE: Entre Maghégni et Pepe, Gabon, le Testu No. 1559, 6.1910 (BM), photographs examined. *D. bicolor* represents the 2-pinnate form of *L. subsimilis.*

Some specimens of *L. subsimilis* are almost eglandulose e.g. Leeuwenberg No. 2507, Kalbreyer No. 14, Mann No. 125, Keay F.H.I. No. 25587 and le Testu No. 1108, whereas there are a few, scattered, oblong, glandular hairs in others e.g. des Abbayes No. 1026 (US).

It is probable that a specimen collected by G. Zenker No. 2568, at Bipinde, Cameroon, in 1903 (K; BM) is *L. subsimilis,* since it is characterized by the oblong sori but the lamina is 4-pinnate, i.e. more deeply divided than is usual in that species. Oblong, yellow, glandular hairs are quite common on the rhachises, costae and costules as well as on the laminal surface.

8. Lastreopsis nigritiana (*Bak.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1963) 245.

Habitat terrestrial in forested ravines, 2,000 to 3,000 ft. alt. *Rhizome* stout, erect, with an apical tuft of fronds, densely clothed with scales which are persistent, dark brown, acuminate, thin, firm, dull, narrowly lanceolate (6: 1), 5 to 8 mm. long, 0·5 to 1 mm. broad, the margin entire or almost so, the lumina golden-brown. *Stipes* crowded, fawn, dark brown towards the base, 15 to 45 cm. long, 1 to 4 mm. broad near the middle, the upper part of the lower surface smooth and glossy, scabrous towards the base, the upper surface channelled, the channel tomentose near the main rhachis, the base of the stipes clothed with similar scales to those on the rhizome. *Main rhachis* winged near the apex, fawn or stramineous, smooth, glossy, the surface of the raised median band in the channel on the upper surface clothed with a dense, brownish tomentum of 4- to 7-celled hairs with prominent septa, the lower surface villous with 3- to 7- celled *Ctenitis*-like hairs; usually with a gemmiferous bulbil towards the apex of the rhachis. *Fronds* 30 to 75 cm. long including the stipes. *Lamina* 20 to 95 cm. long, 15 to 65 cm. broad, 3-pinnate or 3-pinnate-pinnatifid at the base, catadromous throughout or almost so, slightly darker green and dull on the upper surface, herbaceous, quinquangular, the apex acuminate, the lower surface clothed with 2-celled, stiff, whitish hairs and yellow or orange, glandular hairs, the upper surface either devoid of glandular and other hairs or with a few, stiff, 3- to 5-celled hairs near the sinus. *Primary pinnae* 10 to 23 pairs, with wingless petiolules in the lower pairs, the middle and upper pairs sessile and decurrent or in large fronds the middle pinnae with winged stalks, the lowest pair much enlarged, basiscopically produced, very obliquely ovate (2: 1), 12- to 16-jugate, 10 to 35·5 cm. long, 6·5 to 17 cm. broad, the apex acuminate and crenately lobed, the other pairs narrowly oblong-lanceolate (3: 1) or (4: 1), the apex shortly acuminate in the middle pairs but acute to obtuse in the upper pairs. *Secondary rhachises* densely villous below and tomentose above. *Secondary pinnae* with stalked, winged or wingless petiolules towards the base of the largest primary pinnae which are obliquely narrowly oblong-lanceolate (3: 1), 11- to 14-jugate, the apex shortly acuminate, towards the apex of the lamina the secondary pinnae sessile, obliquely oblong (2: 1) and decurrent, the apex acute to broadly rounded, the base inequilateral. *Tertiary segments* with short winged stalks or usually sessile, more or less obliquely oblong (2: 1), the apex rounded, the margin crenate. *Veins* free, pinnate or forked in the ultimate segments, not reaching the margin, the costae and costules clothed densely on the lower surface with spreading, 3- to 5-celled, whitish hairs, the upper surface of the costae bearing 3- to 5-celled, substrigose hairs but the costules and minor veinlets glabrous or almost so. *Sori* indusiate, submarginal, orbicular, borne on the upper portion of simple veinlets or on the acroscopic branchlet of forked veinlets. *Indusium* ca. 0·2 mm. in diam., vestigial, reniform-orbicular, thin, fugacious, the margin erose, bearing yellow or orange, oblong, glandular hairs and a few *Ctenitis*-hairs. *Sporangia* with long pedicels often bearing a stalked, oblong, yellow or orange, glandular hair, the annulus composed of 13 to 15 indurated cells and about 8 thin-walled cells including a lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, brown, the perispore with convoluted crests, equat. diam. 39·38 to 50·63 μ × polar diam. 30 to 35·63 μ, the wing 3·75 to 7·5 μ. *Glandular hairs* oblong, appressed, yellow or orange, very sparse or absent on the upper surface of the main and secondary rhachises, costae, costules, minor veinlets and surface of the lamina but densely scattered on the lower surface of the above.

DISTRIBUTION: Nigeria, Cameroon and Fernando Po.

LECTOTYPE: Fernando Po, 2,000 ft. above the sea, Mann No. 352, 1860 (K), examined; fragment (BM), examined.

SPECIMENS EXAMINED:— *Nigeria:* Province Benin, Div. Benin, Okomu Forest Reserve, Compartment No. 70, gully near camp on sandy banks and tree bases in moderate shade on edge of sandy gully, Richards No. 3892, 21.1.1948 (BM); Ofara-Oluwa district, wet zone, Kitson 7.1909 (BM).

Cameroon: Victoria, fern 2 to 3 ft. high, grows in small clumps together, bush shade, high land, bulbil present, Kalbreyer No. 20, 10.1877 (K; BM); 60 m. on Mamfe-Bamenda Road, terrestrial in forested ravine, alt. 3100 ft., stipes tufted, bulbil absent, Adams No. 1593, 12.1952 (BM).

ABSOLUTE SYNONYMS: *Polypodium nigritianum* Bak., Syn. Fil. (1867) 313; *Dryopteris nigritiana* (Bak.) C. Chr., Ind. Fil. (1905) 279, non O. Ktze. (1891).

EQUIVALENT SYNONYM: *Ctenitis pubigera* Alston in Bol. Soc. Brot. XXX, 2a. ser. (1956) 12; Ferns & Fern-Allies West. Trop. Africa (1959) 73.

The syntypes of *Polypodium nigritianum* Bak. were collected by Barter in the Niger Expedition and by Mann at Fernando Po. Barter's specimen No. 158 (labelled *P. nigritianum* by Baker) at the Kew Herbarium, is *L. barterana*, leaving Mann No. 352 as the lectotype.

The fronds of the 2 Nigerian specimens of *L. nigritiana* cited above are less divided than in the other material. Richards No. 3892 is only 3-pinnate, whereas Kitson's specimen from Ofara-Oluwa is only the apical portion of a lamina. Most of the pinnules have a small tooth at or near the base of the sinus in both specimens. They appear to me to be much closer to *L. nigritiana* than to *L. subsimilis* under which name they have been filed in some herbaria. It is possible that this is an undescribed species but as few specimens of *L. nigritiana* are available for examination in herbaria, it is preferred to include these 2 specimens under that name for the present time until more material comes to hand.

L. nigritiana differs from the closely allied *L. subsimilis* by the orbicular instead of oblong sori, also by the villous secondary rhachises of the former species.

9. **Lastreopsis currori** (*Mett.*) *Tindale* in Vict. Nat. LXXIII (1957) 184.

Key to the Subspecies

1. Lamina very densely to moderately clothed with oblong, glandular hairs. Sori orbicular .. .. ssp. *currori* a.

1.* Lamina eglandulose or almost so. Sori orbicular or slightly oblong .. ssp. *eglandulosa* b.

a. **L. currori** (*Mett.*) *Tindale* ssp. **currori.**

Habitat terrestrial in rainforests or swamp-forests, in wet rocky stream-beds or in forest ravines. *Rhizome* stout, erect, up to 6 cm. high and 3·5 cm. broad, bearing a tuft of fronds; clothed with scales which are dark brown, acuminate, thin, firm, with a few, long, marginal processes, usually narrowly lanceolate (6: 1), 0·5 to 1 cm. long, 0·5 to 1 mm. broad, the cell-walls brown and thick, the lumina brown or golden-brown. *Stipes* crowded, 20 to 90 cm. long, 1·5 to 6 mm. broad at the middle, light brown, brown or stramineous, glossy, smooth and almost glabrous on the lower surface, channelled on the upper surface, the channel tomentose towards the apex, the base of the stipes dark brown and clothed with similar scales to those on the rhizome. *Main rhachis* winged near the apex, the lower surface brown, light brown or stramineous, glossy, smooth, clothed with numerous, orange or yellow, oblong, glandular hairs, a few *Ctenitis*-hairs and a few, brown, fibrillose scales, the surface of the raised median band and the shallow channel on the upper surface bearing a dense tomentum of obtuse, mainly 3-celled *Ctenitis*-hairs; gemmiferous buds mostly present near the apex of the main rhachis on the upper surface. *Fronds* including the stipes usually 50 to 120 cm. long. *Lamina* 20 to 60 cm. long, 15 to 60 cm. broad, 3-pinnate when young, then 3-pinnate-pinnatifid to 4-pinnate, catadromous throughout or almost so, darker green above, paler beneath, herbaceous to subcoriaceous, almost papyraceous, quinquangular, the apex acuminate. *Primary pinnae* 14 to 18 pairs, the petiolules up to 2 cm. long, not winged except near the laminal apex, the lowest pair much enlarged, basiscopically produced, very obliquely ovate (3: 2) to broadly ovate (6: 5), 12- to 20-jugate, 15 to 55 cm. long, 12·5 to 27 cm. broad, the apex acuminate and crenately lobed, the other pairs lanceolate-narrowly oblong (3:1) to narrowly lanceolate-cultrate (6:1), the apex acuminate. *Secondary rhachises* yellow or light brown, the lower surface clothed towards the base with numerous, yellow or orange, oblong, glandular hairs and a few, long, lax *Ctenitis*-hairs, but towards the apex often tomentellous with 2-celled *Ctenitis*-hairs, the upper surface similar to the main rhachis, sometimes with gemmiferous buds towards the apex. *Secondary pinnae* with short, wingless petiolules at the base of each primary pinna, otherwise winged and sessile towards the apex, obliquely lanceolate (3: 1) to ovate (3: 2), the apex acuminate and crenate. *Tertiary segments* with very short petiolules towards the base of each secondary pinna, otherwise sessile, slightly obliquely narrowly ovate-oblong (2: 1), deeply dissected into quaternary segments, the apex obtuse to broadly rounded. *Quaternary pinnules* or *lobes* slightly obliquely oblong, the apex broadly rounded, the margin crenulate. *Veins* free, forked or pinnate in the ultimate segments, not reaching the apices, the lower surface of the costae also sometimes the costules and minor veinlets clothed with stiffly spreading, whitish, 2- or 3-celled hairs with red septa, the upper surface of the costae and costules with a dense vestiture of obtuse, brownish, substrigose, 3- to 5-celled hairs but the minor veinlets glabrous. *Sori* indusiate, orbicular, 0·5 to 1·2 mm. in diam., medial to submarginal, slightly pustulate, borne towards the base or middle of the acroscopic branchlet of the minor veinlets or sometimes near the middle of simple veinlets. *Indusium* fugacious, prominent to almost vestigial, reniform-orbicular, brown, 0·3 to 0·7 mm. in diam., the margin erose or fimbriate, the surface and margin sometimes bearing yellow or orange, oblong-linear, glandular hairs.

Sporangia with a narrow pedicel often bearing a stalked, yellow or orange, oblong, glandular hair, the annulus consisting of 12 to 14 indurated cells and 8 to 10 thin-walled cells including a lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, light brown or brown, with sinuate crests on the perispore, sometimes with a wing surrounding three-quarters of the spore, equat. diam. 30 to 40·63 $\mu \times$ polar diam. 22·5 to 26·25 μ, the wing 3·75 to 7·5 μ in diam. *Glandular hairs* appressed, unicellular, oblong, orange, yellow, cream-coloured or sometimes fawn, very densely to moderately scattered along the lower surface of the rhachises, costae, costules, minor veinlets, lamina and also on the pedicels of the sporangia.

Distribution: Africa (Ivory Coast, Liberia, Ghana, Nigeria, Cameroon, Central African Republic, Gabon, Republic of the Congo, Spanish Guinea, Uganda and the Malagasy Republic).

Holotype: West Tropical Africa, Curror (K), examined. Isotype: (B), examined on my behalf by courtesy of Dr. K. Kramer.

Specimens Examined:—*Ivory Coast:* Massif de Dans, Schnell Nos. 1321 & 1322, 5.1942 (K; P).

Liberia: Bilimu, Sanoquelle District, Central Province, in wet rocky stream-bed, Harley No. F59, 12.1942 (BM; A; K; US 2080750); Mt. Bili, Barker No. 1150, 12.1951 (K).

Ghana: Puso Puso Ravine, Kibi Mountains, East Province, in mountain forest, 1200-1500 ft. alt., Box No. 3264, 8.1941 (BM); Puso Puso, pathside in forest shade, Adams No. 335, 5.1950 (BM); Puso Puso, pathside in ravine, 1,000 ft. alt., stem smooth, Adams No. 80, 2.1950 (BM); Puso Puso, in forest, Adams No. 313, 5.1950 (K); Kibbi-Akim, in swamps, very abundant, fern 4-6 ft. high, Johnson No. 244, 12.1899 (K); near Potroasi (Kibi), in banana plantation on hillside, large, pale green stipe, Adams No. 166, 3.1950 (BM); Bunso Forest Reserve, fronds up to 4 ft. high, in swamp forest, Scholes No. 327, 11.1941 (BM).

Nigeria: Calabar Province, Itu, 1 mile from Obam Itiat on path to Ekpene, fronds 1 m. long, in swamp of secondary high forest with *Raphia*, Jones F.H.I. No. 4806, 1.1943 (BM).

Cameroon: Mamfe, Bamenda, in forest ravine near stream, in deep shade, sloping rocky soil, amongst *Cyathea kameronica*, ground fern, rhachis 3 ft. high, root stock erect, short, stout, Savory No. 491, 9.1952 (BM); Lolodorf, Urwaldgebiet, Staudt No. 231, 1895 (K; BM); Yaúnde-Station, 800 m.s.m., Zenker & Staudt No. 158, 1890-4 (K; BM; P); Yaúnde, Urwaldgebiet, Zenker No. 1433, 1897 (K; BM); 25 km. south of Yaúnde, tall fern, alt. low, de Wit 12.1957 (WAG); ditto, in rainforest, de Wit 12.1957 (WAG).

Gabon: Mayombe, bayaka, Keri, le Testu No. 1566, 6.1910 (P; BM); Mitzic, alt. 600 m., herb layer, young secondary forest, rhizomes scaly, short, oblique, fronds up to 8 ft. high, Jeffrey No. 56, 7.1957 (K).

Spanish Guinea: Tessmann No. 256, 3.1908 (K); Emilio Guinea Nos. 63 & 308, 6.1945 (BM).

Republic of the Congo: Avakubi, forêt ombragée sur le sol, Bequaert No. 1938, 1.1914 (K; BR); Ituri Forest, common throughout the forest, 4,000 ft. alt., fronds 3 ft. high, Holloway, Howard de Walden Expedition No. 33, 4.1930 (BM); Lisala, Vallée de la Mombenga, Robyns No. 1113, 11.1925 (BM; BR); near Luebo, Sankuru-Kasai, about 3 m. high, marsh, Jensen 1.1922 (BM); Ipamu, Vanderyst No. 12167, 9.1922 (BR); Kaniama-Haut Lomami, galerie forestière, 875 m. alt., Mullenders No. 2251, 2.1948 (BR); Kimuishi, galerie de la Mobi, Callens No. 3627, 6.1952 (BR; BM); Ipamu-Ku-Kisit, Vanderyst No. 9856, 7.1922 (BR); Mangé, Kasai, Laurent 12.1903 (BR); Wamba, Kisantu-Kwango, Vanderyst No. 15923, 1925 (BR); Région de Masele, Vanderyst Nos. 12426 & 12581, 10.1922 (BR); Eala, Ipamu-Kikwit, Vanderyst No. 9856, 7.1921 (BR); Panzi, Kisantu-Kwango, Vanderyst No. 15813, 1925 (BR); Walikale-Lubutu, forêt vierge, sol ombragé, Bequaert No. 6630, 1.1915 (BR); entre Lubue et Loange, Vanderyst No. 12275, 10.1921 (BR); Penghe, forêt aux bords de l'Ituri, sur les pierres aux bords d'un ruisseau, Bequaert No. 2535, 2.1914 (BR); Kamtsha, Vanderyst Nos. 11277, 11320 & 11283, 11.1921 (BR).

Uganda: Kipayo, forest-swamp, local, mature frond 4 ft. long, 4,000 ft. alt., Dümmer No. 801, 5.1914 (BM; US 634644; P).

Central African Republic: Berbérati, Oubangui-Chari, in the bed of a stream, in the forest at the back of the mission, rhizome horizontal, 20 cm. long, bearing a tuft of 6 to 8 fronds at one end, petiole variable, 0·6 to 1 m. (high), Tisserant No. 3531, 6.1937 (BM); Butawo, 15 km. N of Bambari, Oubangui-Chari, Tisserant No. 1637, 9.1924 (BM).

Malagasy Republic: Contreforts occidentaux du Massif de Marojejy (nord-east), Bassin de la Lokoho, aux abords du village d'Ambavala, District d'Andapa, forêt nubrophile sur latérite de gneiss, alt. 500-600 m., Humbert No. 23229, 2.1949 (P).

ABSOLUTE SYNONYMS: *Aspidium currori* Mett. in Kühn, Fil. Afr. (1868) 130; *Dryopteris currori* (Mett.) O. Ktze., Rev. Gen. Pl. II (1891) 812; *Ctenitis currori* (Mett.) Tard. in Not. Syst. XIV (1952) 342; Adams & Alston in " A List of the Gold Coast Pteridophyta " in Bull. Brit. Mus. (Nat. Hist.), Bot. I (1955) 174; Tardieu-Blot in Humbert, Fl. Madag., 5^e Fam., I (1958) 346.

EQUIVALENT SYNONYMS: *Polypodium efulense* Bak. in Kew Bull. (1897) 299, HOLOTYPE: Efulen, forest hill, Cameroon, G.L. Bates No. 217, 5.6.1895 (K), examined, ISOTYPE: (BR; BM). examined; *Dryopteris efulensis* (Bak.) C. Chr., Ind. Fil. (1905) 263; *Ctenitis efulensis* (Bak.) Tard. in Not. Syst. XIV (1952) 342; in Mém. I.F.A.N. XXVIII (1953) 138, t. 23, f. 5 (excluding syn. *Dryopteris subcoriacea*); Alston, Ferns & Fern-Allies of West Tropical Africa (1959) 73.

The holotype of *Aspidium currori* at the Kew Herbarium is characterized by large, brown, reniform indusia, whereas in *Polypodium efulense* the type material has smaller brown indusia which are often shrivelled and cover only a small portion of each sorus. Yellow, oblong, appressed, glandular hairs are present in the type collections of both species but they are more common in that of *A. currori*. The secondary rhachises are tomentellous in the type material of both *A. currori* and *P. efulense*, but more sparsely in the former species. After examining a wide range of material from the Kew Herbarium, the British Museum of Natural History and Jardin Botanique de l'État, Brussels, I have concluded that these 2 species are conspecific.

The indusia of *L. currori* are soon shed and often very insignificant but a careful examination of most specimens determined as *Dryopteris efulensis* or *Ctenitis efulensis* in overseas herbaria, reveals these small, brown, reniform coverings on the sori. *Ctenitis efulensis* has been generally regarded as an exindusiate species in the literature on African ferns.

In *L. currori* proliferous buds are found towards the apices of the main rhachises, often developing into quite large daughter plants which eventually become detached from the parent fern. These scaly buds also occur in two American species viz. *L. effusa* and *L. exculta*, as well as in all the African species except *L. barterana*, *L. boivinii* and *L. hornei*.

A chromosome count of $n = 41$ for material of *Lastreopsis currori* (as *Ctenitis efulensis*) was recorded by Prof. Manton in the appendix to Alston, Ferns & Fern-Allies of West Tropical Africa (1959) 81.

b. Lastreopsis currori (*Mett.*) *Tindale* in Vict. Nat. LXXIII (1957) 184 ssp. **eglandulosa** *Tindale* **ssp. nov.**

Lamina eglandulosa vel fere eglandulosa, supra atroviridis, subtus pallidior, tripinnato-pinnatifida vel fere quadripinnata, herbacea vel subcoriacea. Segmenta ultima apice late rotundata, obtusa vel subacuta. Sori mediales vel submediales, orbiculares vel maturitate leviter oblongi, 0·5—2 mm. longi, 0·5—1·5 mm. lati, exindusiati.

Lamina eglandulose or almost so, dark green above, paler beneath, 3-pinnate-pinnatifid or almost 4-pinnate, herbaceous or subcoriaceous. *Ultimate segments* broadly rounded, obtuse or subacute at the apex. *Sori* medial or submedial, orbicular or slightly oblong at maturity, 0·5 to 2 mm. long, 0·5 to 1·5 mm. broad, exindusiate.

HOLOTYPE: Région Kisantu, Léopoldville, Moyen-Congo, Republic of the Congo, H. Callens No. 2806, 11.1950 (BM).

DISTRIBUTION: Republic of the Congo and Portuguese Congo.

SPECIMENS EXAMINED:—*Republic of the Congo:* Kisantu, Léopoldville, Moyen-Congo, en culture au jardin, Callens No. 881, 3.1953 (BM) and Callens No. 882, 3.1953 (BM); Kizu, Wellens No. 162, 1921 (BR); Boko Nzadi, Vanderyst No. 6117, 4.1916 (BR); between Loange and Lubue, Vanderyst Nos. 12275 and 12559, 10.1922 (BR); bords de la Lubue, Vanderyst No. 12310, 10.1922 (BR); Kisala, Wellens No. 318, 8.1923 (BR); Gomamba, Flamigni No. 60, 7.1926 (BR).

Portugese Congo: near Caio-Hombe (?), Mayumbe, fronds up to 1.5 m. in length, common stalk up to 1 m. in length, in shady humid forests, Gossweiler No. 7922, 3.1919 (BM).

The almost coriaceous laminas in Vanderyst Nos. 40046 and 40152 (BR) collected at Kikoka, Kisantu, Congo, are characterized by very broadly rounded ultimate segments. Unfortunately the rhizomes are missing in these 2 specimens.

10. Lastreopsis vogelii (*Hook.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1963) 245.

Habitat terrestrial in wet gullies. *Rhizome* short, stout and ascending. *Stipes* crowded, ca. 65 cm. long, ca. 7 mm. broad towards the middle, stramineous, light brown towards the base, the lower surface glabrous and smooth or slightly scabrous, the grooves on the upper surface bearing a few, dark brown scales, clothed towards the base with scales which are dark brown, acuminate, thin, with long marginal processes, linear (12: 1), ca. 1 cm. long and 0·5 mm. broad, the lumina golden-brown. *Main rhachis* winged very close to the apex only, stamineous, slightly glossy and glabrous or with a few, intestiniform hairs on the lower surface, the channel and median raised band between the 2 ridges on the upper surface densely tomentose with brownish, obtuse or acute, 5- to 6-celled *Ctenitis*-hairs; gemmiferous by scaly buds. *Fronds* up to almost 3 m. in length including the stipes. *Lamina* up to 145 cm. long and 100 cm. broad, 3-pinnate-pinnatifid at the base, catadromous except near the apices of the secondary pinnae, dark green, slightly glossy above, herbaceous to subcoriaceous, quinquangular, the surface glabrous, the apex acuminate. *Primary pinnae* with a wingless petiolule up to 3·8 cm. long in the basal pair, the middle pinnae with winged petiolules, the upper pinnae sessile and decurrent, the middle and upper pairs obliquely narrowly oblong-lanceolate (3: 1), the apex shortly acuminate, the lowermost pair much enlarged and basiscopically produced, 30 to 52 cm. long and ca. 25 to 30 cm. broad, the apex acuminate. *Secondary rhachises* with the channel and median raised band on the upper surface densely tomentose, the lower surface stramineous, smooth and glabrous. *Secondary pinnae* with an unwinged stalk in the lower segments on the basal primary pinnae, the middle secondary pinnae with winged petiolules, the upper sessile and decurrent, the basal basiscopic secondary pinnae much enlarged, ca. 24 cm. long and ca. 6 cm. broad, obliquely narrowly oblong-lanceolate (4: 1), the apex shortly acuminate and deeply lobed, the secondary pinnae on the middle primary pinnae oblong-narrowly ovate (2: 1), usually 5·5 to 8·5 cm. long and 2·5 to 3·5 cm. broad, the apex shortly acuminate, dissected two-thirds to three-quarters of the way to the costa. *Tertiary segments* with a short, winged petiolule in the basal basiscopic pair, otherwise sessile and decurrent, obliquely narrowly oblong (3: 1), on the basal primary pinna 3 to 3·5 cm. long and 1 to 1·5 cm. broad, the apex acute. *Quaternary segments* sessile, 1 to 1·8 cm. long and 5 to 7 mm. broad, oblong-narrowly ovate (2: 1), the apex obtuse or slightly truncate. *Ridges* of the secondary rhachises continued along the decurrent bases of the segments for a shorter distance than in the other species of *Lastreopsis*. *Veins* prominent, free, pinnate in the segments, not reaching the margin, clothed on the lower surface of the costae and costules with a few, scattered, whitish, stiffly spreading hairs but the minor veinlets glabrous on both surfaces, the costae and to a lesser extent the costules with 3- to 4-celled, brownish, appressed hairs. *Sori* exindusiate, superficial, orbicular, ca. 1 to 1·8 mm. in diam., usually medial, usually borne on the middle of simple veinlets or on the acroscopic branchlet of forked veinlets just above the bifurcation. *Sporangia* with a narrow pedicel often bearing a stalked, yellow, oblong, glandular hair, the annulus composed of 15 to 16 indurated cells and 9 to 10 thin-walled cells; dehiscence lateral. *Spores* bilateral, monolete, globose-ellipsoidal, brown, the perispore with sinuate crests, equat. diam. 41·25 to 52·5 μ × polar diam. 33·75 to 37·5 μ including the dissected wing which is 3·75 to 7·5 μ in diam. *Glandular hairs* oblong, appressed, unicellular, yellow, sparsely scattered on the lower surface but absent on the upper surface of the secondary rhachises, costae, costules, minor veinlets and lamina, also occurring on the pedicels of the sporangia.

Distribution: Southern Nigeria, Fernando Po, Republic of the Congo and Cameroon.

Lectotype: Fernando Po, Vogel No. 229 (K), photograph (examined). The photo was very kindly forwarded by the Royal Botanic Gardens, Kew. The lectotype was chosen by Alston in The Ferns & Fern-Allies of West Tropical Africa (1959) 73.

Specimens Examined:—*Nigeria:* Province Benin, Div. Benin, Okomu Forest Reserve, S of Reuben's Camp, on bottom of wet gully, frond 8 ft. 9 ins., 4 ft. 10 ins. to lowest pinnae, Brenan & Keay No. 3696, 12.1947 (BM; K).

Cameroon: N'dian, Dusen 4.1892 (BM).

Republic of the Congo: Fomulac, Kisantu, Vanderyst Nos. 33810 and 33812, 8.1932 (BR); Vanderyst No. 31695 bis (BR).

Absolute Synonyms: *Polypodium vogelii* Hook., Sp. Fil. IV (1862) 271; *Phegopteris vogelii* (Hook.) Kühn, Fil. Afr. (1868) 124.

Equivalent Synonyms: *Dryopteris subcoriacea* C. Chr., Ind. Fil. (1905) 295; *Ctenitis subcoriacea* (C. Chr.) Alston in Bol. Soc. Brot. XXX, 2a. sér. (1956) 12; Alston, Ferns & Ferns Allies West Trop. Africa (1959) 73.

Christensen based *Dryopteris subcoriacea* directly on *Polypodium vogelii* Hook., as a new name was necessitated in *Dryopteris* due to the presence of *D. vogelii* (Hook.) C. Chr., based on *Aspidium vogelii* Hook. (1854). The lectotype for *D. subcoriacea* is therefore the same as for *Polypodium vogelii.*

Hooker cited 4 specimens with the original description of *Polypodium vogelii* namely:— Fernando Po, Vogel No. 229 (the lectotype); Fernando Po, Gustav Mann No. 352 (*Lastreopsis nigritiana*); Aboh, on the Quorra, Barter in Baikie's Expedition No. 158 (*L. barterana*) and Isle San Nicol, Cape de Verdes, Forbes (*Dryopteris oligodonta* (Desv.) Pic.-Ser.). Hooker noted that " Forbes' plant has the ultimate segments and pinnules decurrent, may probably prove a distinct species ".

According to Alston, the material collected in Okomu Forest Reserve by Brenan & Keay No. 3696, is a good match for the lectotype.

11. Lastreopsis barterana (*Hook.*) *Tard.* in Not. Syst. XIV (1952) 343; Tardieu in Mém. I.F.A.N., XXVIII (1953) 129, t. 23, f. 1.

Habitat terrestrial in rainforests, at about 1,000 ft. alt. *Rhizome* stout, suberect or erect, about 1·3 cm. high, densely clothed with dark brown scales which are acuminate, thin, dull or slightly glossy, appressed, 5 to 7 mm. long and 0·5 to 0·7 mm. broad, the cells being hexagonal to rectangular, with thick, dark brown walls and yellow lumina, the margin of the scales almost entire with a few fimbriae or often slightly dentate. *Stipes* erect, about 30 cm. long, about 1·5 to 2 mm. broad near the middle, very slightly scabrous, dull, fawn, light brown towards the base, clothed near the base with scales similar to those on the rhizome, also bearing throughout its length on the lower surface unbranched, whitish, acicular, spreading, 2- to 9-celled, acute or sometimes glandular-tipped hairs with dark red articulations. *Main rhachis* not winged, except near the apex with the decurrent bases of the primary pinnae, adnate displaced pinnules absent, slightly scabrous to scabrous, dull, with 2 ridges on the upper surface, the raised portion in the shallow intervening channel clothed with shortly villous hairs, the lower surface of the main rhachis densely villous with whitish, spreading, unbranched, acute or sometimes glandular-tipped hairs which are up to 10 cells long; gemmiferous bulbils absent. *Fronds* including the stipes about 40 to 75 cm. long. *Lamina* 25 to 55 cm. long, 11 to 40 cm.

broad, 1-pinnate-pinnatifid to 3-pinnate-pinnatifid, catadromous almost throughout or at the base only, submembranous, herbaceous to thinly coriaceous, slightly darker on the upper surface, the apex acuminate, the surface of the lamina with a few, glandular-tipped, 2- to 4-celled, acicular hairs between the veins. *Primary pinnae* with villous petiolules which are 3 to 10 mm. long and wingless in the lowest pairs, otherwise much shorter and winged, markedly upcurved, widely spaced, the lowest 1 or 2 pairs opposite, the upper and middle pairs subopposite or alternate, the apex acuminate in the lower pairs but acuminate to acute in the upper pairs, the basal pair 10 to 20 cm. long and 5 to 15 cm. broad, obliquely narrowly ovate (2: 1) or obliquely ovate (3: 2), basiscopically produced. *Secondary pinnae* with a very short, winged petiolule in the lower 1 or 2 pairs, otherwise sessile, crowded, without any basiscopic pinnules adnate to the secondary rhachis, the lowest pair 3 to 11 cm. long, 1·3 to 3 cm. broad, obliquely narrowly ovate (2: 1) to lanceolate (3: 1) or narrowly oblong-lanceolate (3: 1), the apex subacute in the largest pairs, otherwise subacute, obtuse to broadly rounded. *Tertiary segments* constricted at the base, up to 1·8 cm. long and 3 to 8 mm. broad, more or less oblong or narrowly ovate-oblong, the apex broadly rounded to subacute, the margin entire or slightly crenate, the basiscopic margin very slightly thickened, the upper and lower surface with a few, 2-celled, whitish hairs (often with a rounded, glandular head) scattered between the veins. *Secondary rhachis* without scales, fawn, glossy, slightly villous below, the upper surface clothed as on the main rhachis. *Veins* free, forked or pinnate in the lobes, the veinlets not reaching the margin. *Costae* and *costules* villous on the lower surface with long, weak, unbranched, whitish, often glandular-tipped hairs usually 3 to 7 cells long, shortly villous on the upper surface, the minor veinlets almost glabrous. *Sori* exindusiate, almost marginal, orbicular, numerous, ca. 0·5 mm. in diam., either subterminal on simple minor veinlets or medial or subterminal on their upper branchlets. *Sporangia* with a narrow, elongated pedicel with 1 stalked, oblong, red gland, the annulus composed of 13 to 15 indurated cells and about 6 thin-walled cells including a lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, brown with dark brown, reticulate crests, equat. diam. 31·88 to 37·5 μ × polar diam. 22·5 to 28·13 μ, the crests ca. 2 μ in diam. *Glandular hairs* oblong, appressed, sessile, unicellular, red, scattered thickly along the main rhachis, costae, costules, minor veinlets and the surface of the lamina.

DISTRIBUTION: West Tropical Africa (Cameroon, Nigeria and Fernando Po).

HOLOTYPE: Fernando Po, Barter, Niger Exped. 1857 (K), examined.

SPECIMENS EXAMINED:—*Cameroon:* Logbatjeck, région d'Edea, forêt humide, Nicklès No. 96, 4.1948 (P); near Cross River, Mamfe Forest Reserve, 1,000 ft. alt., in rainforest, on wet clay bank and rock, Savory No. 630a (BM), a depauperate specimen.

Nigeria: Aboh, Niger Expedition, Barter No. 158 (K).

ABSOLUTE SYNONYMS: *Polypodium barteranum* Hook., Sp. Fil. IV (1862) 253; *Phegopteris barterana* (Hook.) Mett. ex Kühn, Fil. Afr. (1868) 121; *Dryopteris barterana* (Hook.) C. Chr., Ind. Fil. (1905) 254; *Ctenitis barterana* (Hook.) Alston in Bol. Soc. Brot., sér. 2A, XXX (1956) 12; Alston in The Ferns and Fern-Allies of West Tropical Africa (1959) 73.

Although Barter No. 158 is cited by Hooker as one of the specimens with the original description of *Polypodium vogelii* Hook., I have no hesitation in determining it as *L. barterana.* This specimen is also labelled "*Polypodium nigritianum* Bak." in the latter's handwriting.

12. Lastreopsis velutina (*A. Rich.*) *Tindale* in Vict. Nat. LXXIII (1957) 184; Crookes & Dobbie, N.Z. Ferns (1963) 248, pl. 249.

Habitat in dry lowland forests, on slopes above creeks or sometimes on headlands. *Rhizome* erect, robust, short, about 7 cm. long, densely clothed with scales which are persistent, castaneous to dark brown, hair-pointed, thin, entire or sometimes with an occasional tooth or glandular hair, linear, 1 to 1·7 mm. long, 0·5 to 1·5 mm. broad, the lumina golden-brown or brown. *Stipes* tufted, crowded, 23 to 40 cm. long, 1·5 to 3 mm. broad near the middle, not winged, red-brown to dark red-brown, almost black at the base, the lower surface glossy and scabrous, the upper surface tomentose in the channel near the apex, both surfaces clothed with fugacious, 3- to 5-celled *Ctenitis*-hairs, towards the base bearing similar scales to those on the rhizome. *Main rhachis* winged only at the apex, with adnate displaced pinnules present in the upper part of the main rhachis, red-brown, glossy, scabrous, the lower surface densely clothed with spreading, glandular-tipped, 3- to 5-celled, brownish-red *Ctenitis*-hairs as well as a few, glossy, acuminate, entire, brown, narrowly lanceolate scales, the channel and the raised portion between the 2 ridges on the upper surface bearing numerous, acute, dark red, 6- to 8-celled hairs. *Fronds* including the stipes mostly 30 to 65 cm. long. *Lamina* 15 to 55 cm. long, 15 to 45 cm. broad, 3-pinnate-pinnatifid to 4-pinnate, 3-pinnate in young fronds, markedly catadromous, dark green, brownish when dried, slightly paler beneath, soft, membranous, quinquangular, velvety, the lower surface and margins clothed with acute, soft, brown or white, spreading hairs, the upper surface with similar brown hairs, the apex acuminate. *Primary pinnae* 12 to 18 pairs, with velvety petiolules which are winged except in the basal and/or middle pinnae, fairly widely spaced to overlapping, 15- to 18-jugate, the lowest pair basiscopically produced, much enlarged, 9 to 26 cm. long, 3·5 to 20 cm. broad, very obliquely lanceolate-deltoid (3: 1) to broadly ovate (6: 5); apex acuminate. *Secondary rhachises* clothed on the lower surface with acute or glandular-tipped, soft, spreading hairs and a few, glossy, brown scales as well as a few, long *Ctenitis*-hairs, the upper surface with a similar vestiture to that of the main rhachis. *Secondary pinnae* with velvety petiolules which are winged except in the lowest pair, 7- to 15-jugate, the lowest pair 3·5 to 14 cm. long, 1·2 to 4 cm. broad, obliquely lanceolate-deltoid (3: 1) to narrowly ovate-deltoid (2: 1), the apex acuminate. *Tertiary pinnae* with winged petiolules, the largest pair 1·5 to 3·7 cm. long, 1 to 2 cm. broad, narrowly ovate-oblong (2: 1) to ovate-oblong (3: 2), the apex acute. *Quaternary segments* sessile or sometimes with a winged petiolule, more or less oblong or triangular, the apex acute, obtuse or broadly rounded, the margin with a few, subacute teeth. *Veins* free, simple, pinnate or forked in the ultimate segments, not prominent, not reaching the margin, both surfaces of the costae, costules and minor veinlets densely villous, also with a few, 8- to 10-celled *Ctenitis*-hairs. *Sori* indusiate, orbicular, 0·5 to 1 mm. in diam., medial, sometimes occupying almost the whole breadth of the narrow segments, borne on the fork of the minor veinlets or medial on simple veinlets. *Indusium* ca. 0·4 to 1 mm. in diam., orbicular-reniform, light brown, darker in the centre, thin, fairly persistent, erose, glabrous or more usually clothed with orange or yellow, glandular hairs on the surface and/or margin, sometimes also bearing a few, septate hairs. *Sporangia* with a narrow pedicel sometimes bearing an oblong or round, orange or yellow, glandular hair, the annulus composed of 14 to 16 indurated cells and 5 to 9 thin-walled cells including the lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, the perispore light brown, saccate, with black, flaccid, rounded or sometimes elongated elevations which are 2 to 3·75 μ in diam., equat. diam. 21 to 36·53 μ × polar diam. 18 to 28·63 μ including the protuberances. *Glandular hairs* oblong or round, appressed, unicellular, yellow or orange, densely scattered on the lower surface but sparsely on the upper surface of the rhachises, costae, costules, minor veinlets and lamina.

Distribution: New Zealand (North and South Islands). Sea level to 1,000 ft. alt.

Holotype: Nouvelle Zélande, D'Urville dedit (Herbarium Richard), (P), examined.

Specimens Examined:—*New Zealand: North Island:* Auckland, Ohampo, Häusler 1895 (NSW P7937); Konini, about 15 miles SE of Palmerston North, 400 ft. alt., bush edge, at base of hillside, Lovis N.Z. No. 347, 9.1955 (NSW P7932); Coromandel Harbour, Cheeseman (NSW P7939); Hot Water Beach, Mercury Bay, Hynes 10.1953 (AK 31440; NSW P7935); Karori, Wellington, edge of bush remnant, Rawson 4.1952 (NSW P7936); Wellington, Carron (NSW P7940); Otari, Wellington, Mason 6.1939 (CHR 22730A); near Ngahauranga, Wellington, Atkinson 4.1922 (D.S.I.R. 2126); without specific locality, Sinclair (P).

South Island: Rameka Creek, Pikikiruna Range, Takaka, Nelson Prov., bush-clad slope above creek, alt. 500 ft., Lovis N.Z. No. 1309, 2.1956 (NSW P7933); Rangihaieta Headland, Takaka, Nelson Province, bush remnant on top of headland, 150 ft. alt., Lovis N.Z. No. 1254, 2.1956 (NSW P7931); Anokoha, Pelorus Sound, Marlborough, coastal forest, Healy 2.1939 (CHR 46650).

ABSOLUTE SYNONYMS: *Aspidium velutinum* A. Rich., Voy. l'Astrolabe (1832) 70; *Nephrodium velutinum* (A. Rich.) Hook. f., N.Z. Fl. II (1854) 39, t. 80; *Lastrea velutina* (A. Rich.) Brack., Expl. Exp. XVI (1854) 198; *Dryopteris velutina* (A. Rich.) O. Ktze., Rev. Gen. Pl. II (1891) 814; C. Chr., Ind. Fil. (1905) 300; Cheeseman, Man. N.Z. Fl. (1925) 34-5; *Ctenitis velutina* (A. Rich.) Copel., Gen. Fil. (1947) 124; Dobbie & Crookes, N.Z. Ferns (1952) 254, photo 255; Harris in D.S.I.R. Bull. No. 116 (1955) 132, 44, pl. 9, f. 13; Allan, Fl. N.Z. (1961) 91.

In this species the lower margin of the ultimate segments is very slightly thickened but it is a continuation of the hairy ridges on the secondary rhachises.

A chromosome count of $n = 41$ was made by G. Brownlie on material of *L. velutina* collected at Queen Charlotte Sound, New Zealand (Brownlie No. 47). This was published in Trans. Roy. Soc. N.Z. LXXXV (1958) 214.

13. Lastreopsis boivinii (*Bak.*) *Tard.* in Humbert, Fl. Madag., 5^{e}. Fam., I (1958) 347, 311 (Pl. XLII, f. 1-3).

Habitat terrestrial in forests, on gneiss and granite, about 1600 m. alt. *Rhizome* thick, oblique, clothed with scales which are acuminate, dark russet to almost black, with a very narrow, fawn border, glossy, lanceolate, coriaceous. *Stipes* crowded, brown, except brownish-black towards the base, ca. 65 cm. long, stout, with 3 channels above, clothed on the abaxial surface with soft, weak, septate, brownish hairs, the base of the stipes bearing scales which are similar to but much broader than those on the rhizome. *Main rhachis* brown or stramineous, glossy, clothed on the lower surface with very short, red hairs, the raised median band in the broad, shallow, upper channel clothed with numerous, unbranched, 6- to 10-celled hairs having red articulations, without gemmiferous bulbils. *Secondary rhachises* clothed above as on the main rhachis except the hairs may be only 6 cells long, bearing on the lower surface weak, acicular, septate hairs. *Lamina* 3- to 4-pinnate-pinnatifid, catadromous throughout, ca. 50 to 70 cm. in length, ca. 40 to 45 cm. broad at the base, subcoriaceous to herbaceous, brown when dried, the lower surface bearing a few, weak, 3- to 4-celled hairs with red articulations, a few true, 2-celled *Ctenitis*-hairs being scattered around the margin and lower surface of the lamina. *Primary pinnae* subopposite, 7- to 16-jugate, the upper pairs equilateral but the basal pair basiscopically enlarged and about 35 to 50 cm. long. *Secondary pinnae* obliquely lanceolate, the apex finely acuminate to subacute or obtuse, the basiscopic secondary pinnae of the lowest primary pinnae up to 18 cm. long, the acroscopic pair opposite being 4 to 5 cm. long, the central secondary pinnae shortly petiolulate, more or less oblong or oblong-lanceolate, acuminate, about 3 to 8 cm. long, 1 to 3·5 cm. broad at the base, the upper pairs sessile and decurrent at the base forming a narrow wing along the vein, unequal-sided, the anterior side slightly expanded, dissected almost to the midnerve into 6 to 12 pairs of segments. *Tertiary segments* oblong-lanceolate, more or less lobed or dissected, the apex obtuse or acute, the margin crenate. *Veins* free, subpinnate, forked or simple in the ultimate segments, thickened towards the apex, not reaching the margin, the lower surface of the secondary rhachises, costae and costules clothed more or less densely with spreading, brownish, 3- or 4-celled *Ctenitis*-hairs having red articulations. *Sori* indusiate, round, comparatively small, 0·5 to 1 mm. in diam., submarginal, situated at or towards the end of the minor veinlets, one occurring near the sinus between 2 lobes, slightly pustulate on the upper surface of the lamina. *Indusium* large, 0·5 to 0·8 mm. in diam., reddish (light brown when dried), orbicular-reniform, persistent, glabrous. *Sporangia* with a narrow pedicel bearing a stalked, oblong, yellow gland; annulus composed of 13 to 15 indurated cells and 7 to 9 thin-walled cells. *Spores* bilateral, monolete, globose-ellipsoidal, brown, ruguloso-saccate or sometimes with a wing, equat. diam. 31·88 to 41·25 μ × polar diam. 22·5 to 33·75 μ (including the protuberances which are 3·75 to 7·5 μ broad.) *Glandular hairs* oblong, appressed, unicellular, dark orange, yellow or hyaline, densely scattered along the abaxial surface of the costae, costules, minor veinlets and lamina but absent on the indusia and sometimes on the upper surface of the lamina and veins.

Distribution: Malagasy Republic (Madagascar) in the floristic regions of the east and centre according to Christensen in Dansk Bot. Ark. VII (1932) 62.

Holotype: Madagascar, Boivin (K), examined.

Specimens Examined:—*Malagasy Republic:* Be Kilns Mountains, NW Madagascar, Last 12.1890 (K); Antananarivo, Pool 4.1876 (K); Massif de l'Anjanaharibe (Pentes et Sommet Nord), à l'ouest d'Andapa (haute Andramonta, Bassin de la Lokoho, Nord-est), forêt ombrophile sur gneiss et granite, sylve à lichens, vers 1600 m. alt., Humbert, Capuron et Cours No. 24730, 12.1950-1.1951 (P); Imarina, Deans Cowan 1881 (BM).

Absolute Synonyms: *Nephrodium boivinii* Bak. in Hook. & Bak., Syn. Fil. (1874) 501; *Aspidium boivinii* (Bak.) Kühn in v. Deck. Reis. III, Bot. (1879) 65; *Dryopteris boivinii* (Bak.) O. Ktze., Rev. Gen. Pl. II (1891) 812; C. Chr. in Bonap., Notes Ptérid. XVI (1925) 165, pl. VII; C. Chr. in Dansk Bot. Ark. VII (1932) 62; *Ctenitis boivinii* (Bak.) Tard. in Mém. Inst. Sci. Madag., Sér. B, VI (1955) 220.

Equivalent Synonyms: *Nephrodium granulosum* Bak. in Journ. Bot. XXIX (1891) 4, Holotype: Be Kilns Mountains, NW Madagascar, Last 12.1890 (K), examined; *Dryopteris subgranulosa* C. Chr., Ind. Fil. (1905) 295, a new name based on *N. granulosum* Bak.

The so-called " granular " appearance of the frond of *Nephrodium granulosum* mentioned by Baker in his original description of this species must refer to the very numerous, cylindrical, orange or yellow glands found on the lamina of the type specimen.

Lastreopsis boivinii and *L. hornei* are very closely related species. Subsequent collections may show that they are conspecific but the main distinction between them is the almost glabrous secondary rhachises, costae and costules of *L. hornei*, whereas they are pubescent in the other species.

14. Lastreopsis hornei (*Bak.*) *Tindale* in Vict. Nat. LXXIII (1957) 184; Tardieu-Blot in Humbert, Fl. Madag., 5^{e} Fam., I (1958) 348.

Habitat in shady forests. *Rhizome* very thick, oblique, ca. 5 cm. in diam., densely clothed with scales which are more or less glossy, dark brown, acuminate, thick, chitinous, very narrowly lanceolate, entire, 1·5 to 2 cm. long, 1·5 to 2·5 mm. broad, often with a narrow, fawn border. *Stipes* tufted, ca. 95 cm. in length, ca. 1 cm. in diam. near the middle, fawn and smooth except dark brown and tuberculate towards the base, dull, densely pubescent with soft, fugacious, brown, mostly 5- to 10-celled hairs, the groove near the apex densely clothed with red-brown *Ctenitis*-hairs, the base of the stipes with similar scales to those on the rhizome. *Main rhachis* glossy, fawn or stramineous, almost glabrous or clothed with short, 2-celled, glandular-tipped hairs and weak, 4- to 10-celled hairs with dark red articulations, the thickened leaf-margin continuous on the upper surface with the ridges of the rhachises as is typical of the genus, the broad intervening channel clothed with true *Ctenitis*-hairs on the raised portion, these hairs sometimes glandular-tipped, 3- to 4-celled with dark red articulations; gemmiferous bulbils absent. *Lamina* about 60 to 90 cm. broad and long, 3- or 4-pinnate-pinnatifid, catadromous, quinquangular, dark green on the upper surface, much paler beneath, the lower surface glabrous except for an occasional cylindrical hair and a few, 2- or 3-celled, glandular-tipped hairs along the margin. *Primary pinnae* 34 to 42 cm. long, 23·5 to 30 cm. broad, obliquely narrowly ovate (2: 1), basiscopically produced, about 17- to 19-jugate, the apex shortly acuminate. *Secondly pinnae* more or less oblong-lanceolate (3: 1), 6 to 15 cm. long, 3·5 to 8 cm. broad, 10- to 14-jugate, the apex shortly acuminate or acute. *Tertiary segments* oblong-rhomboidal (2: 1 or 3: 1), unequal-sided at the base, 1·3 to 4·5 cm. long, 0·7 to 1·5 cm. broad, 5- to 9-jugate, the apex somewhat obtuse, almost spinulose-dentate or crenulate. *Quaternary segments* more or less oblong, the apex broadly rounded, sometimes again lobed. *Secondary rhachis* fawn and smooth, winged only at the apex in large primary pinnae, the vestiture the same as on the main rhachis. *Veins* in the ultimate lobes simple or forked, pinnate below, not reaching the margin, the costae clothed below with a few, ctenitoid, lax hairs having red articulations. *Sori* orbicular, nearly marginal, borne on the acroscopic branchlet of the vein or terminal on a simple veinlet, 0·3 to 1 mm. in diam. *Indusium* orbicular-reniform, firm, persistent, entire or with a few marginal processes, brown, 0·5 to 1 mm. in diam., glabrous. *Sporangia* with a long, narrow pedicel bearing an oblong gland; annulus composed of 15 to 18 indurated cells and 7 to 8 thin-walled cells including the lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, pale yellow, with a few, narrow crests on the perispore, sometimes surrounding the spore or forming a loose network, equat. diam. 37·5 to 43·1 μ × polar diam. 24·38 to 37·5 μ including the crests, the narrow wing about 18·8 μ broad. *Glandular hairs* oblong, appressed, unicellular, yellow or orange, densely clothing the lower surface of the costae, costules and minor veinlets, with an occasional gland occurring on the surface of the lamina.

DISTRIBUTION: The Seychelles (Indian Ocean) and Malagasy Republic.

HOLOTYPE: Mahé, not common, lowest pinna of large deltoid frond 3 ft. long and 2 ft. broad, Horne No. 182, 9.1871, received 2.1872 (K), labelled by Baker " *Nephrodium* n.sp. next *intermedium* ", examined. ISOTYPE: (BM), examined.

SPECIMENS EXAMINED:—*Seychelles:* Without specific locality, Horne No. 685, received 4.1875 (K; BM).

Malagasy Republic: Contreforts occidentaux du Massif de Marojejy (Nord-est), Près du Col de Doanyanala (Limite des Bassins de la Lokoho et de l'Andraronga), forêt ombrophile sur latérite de gneiss, 600-700 m. alt., Humbert No. 23006, 1-2.1949 (P); ditto, alt. 900-1000 m., Humbert No. 23149 (P).

ABSOLUTE SYNONYMS: *Neprodium hornei* Bak. in Hook. & Bak., Syn. Fil., ed. 2 (1874) 500; Bak. in Fl. Mauritius and the Seychelles (1877) 497; *Dryopteris hornei* (Bak.) O. Ktze., Rev. Gen. Pl. II (1891) 813.

Very little material of this species was available for examination, as it appears to be unrepresented in most of the larger herbaria in the world. It is very closely allied to *L. boivinii* of the Malagasy Republic (see page 289).

15. Lastreopsis subsparsa (*v.A.v.R.*) *Tindale* in Vict. Nat. LXXIII (1957) 184.

Habitat in tropical rainforests, terrestrial. *Rhizome* oblique, thick, 1 to 3 cm. in diam., covered with the broken bases of the stipes, clothed with scales which are fugacious, dark brown, acuminate, papery, dull or slightly glossy, entire or almost so, linear (12: 1) to lanceolate (3: 1), up to 1 cm. long, 0·5 to 1·5 mm. broad, the cell-walls rather thick, the lumina golden-brown or brown. *Stipes* in a tuft at the apex of the rhizome, 15 to 55 cm. long, 1·5 to 3·5 mm. broad near the middle, brown, yellow-brown or light brown, dark brown towards the base, not winged, dull, slightly scabrous or smooth, prominently grooved above, tomentose in the channel near the apex on the upper surface, the lower surface clothed with fugacious, 2-celled *Ctenitis*-hairs, the base of the stipes bearing similar scales to those on the rhizome. *Main rhachis* winged near the apex with the decurrent bases of the pinnae, brown, yellow-brown, light brown or fawn, dull, smooth or slightly scabrous, the raised median portion and the channel between the 2 grooves on the upper surface clothed with obtuse or glandular-tipped, brown, 2- to 5-celled *Ctenitis*-hairs, the lower surface pubescent with fairly persistent, 2-celled *Ctenitis*-hairs and a few, longer, 5- to 7-celled, lax *Ctenitis*-hairs as well as a few brown scales; never gemmiferous by scaly buds. *Fronds* including the stipes 30 to 70 cm. in length. *Lamina* 19 to 32 cm. long, 10 to 23 cm. broad, 3-pinnate or 3-pinnate-pinnatifid at the base, catadromous at the base, dark green above, paler on the lower surface, coriaceous, quinquangular, the surface (especially below the sinuses) clothed with a few, scattered, lax, 2- to 4-celled *Ctenitis*-hairs, the apex acuminate or obtuse. *Primary pinnae* 4 to 12 pairs, the petiolules up to 2·2 cm. long and usually narrowly winged in the lower and middle pairs, sessile and decurrent in the upper pairs, ascending, the lowest pair much enlarged and basiscopically produced, 7 to 25 cm. long, 2·5 to 20 cm. broad, the apex acuminate, obliquely narrowly ovate-deltoid (2: 1) to broadly ovate-deltoid (6: 5), 7- to 12-jugate, the apex acuminate. *Secondary rhachises* tomentose on the upper surface with obtuse, 2- to 4-celled *Ctenitis*-hairs, more or less clothed on the lower surface with similar hairs. *Secondary pinnae* 6- to 10-jugate, with winged petiolules or the upper pairs sessile, the lowest pair the largest, 6·5 to 13 cm. long, 2 to 4 cm. broad, obliquely lanceolate (3: 1), the apex acuminate. *Tertiary segments* with a winged petiolule or sessile, obliquely lanceolate (3: 1), more or less oblong-elliptical or obliquely rhomboidal, the margin serrulate or crenulate, the apex broadly rounded. *Veins* free, simple, forked or sometimes pinnate in the ultimate lobes, very oblique, not reaching the margin, sometimes prominent, the costae, costules and minor veinlets sparsely to moderately clothed below with 2- to 4-celled, obtuse or glandular-tipped *Ctenitis*-hairs, the upper surface of the costae and costules sparsely pubescent with similar hairs, the minor veinlets glabrous. *Ultimate segments* entire, crenate or dentate, the apex obtuse to broadly rounded. *Sori* indusiate, superficial, orbicular, medial on simple veinlets or the acroscopic veinlet of forked veins, about 1 to 1·3 mm. in diam. (rarely 0·5 to 1 mm. in diam.). *Indusium* 0·5 to 1 mm. in diam., orbicular-reniform, with a closed sinus, brown, firm, fairly persistent, the margin erose, devoid of glandular or septate hairs on the surface, sometimes with a few, septate hairs along the margin. *Sporangia* with a long narrow pedicel often bearing a stalked, dark red, oblong gland, the annulus composed of 12 to 14 indurated cells and 8 to 9 thin-walled cells. *Spores* bilateral, monolete, globose-ellipsoidal, dark brown, ruguloso-saccate, equat. diam. 30 to 33·75 μ × polar diam. 20·63 to 28·13 μ including the rounded protuberances which are 1·88 to 3·75 μ in diam. *Glandular hairs* absent except on the pedicels of the sporangia.

DISTRIBUTION: Java and Timor.

HOLOTYPE: Mt. Hyang, Java, C. A. Backer No. 9803 (examined). This specimen, which was kindly lent by Bogor Herbarium, is labelled:—Besoeki, Hyangcomplex Tjimorolantjang, C. A. Backer No. 9803, 26.10.1913 (BO 102294, 102295 and 102296).

SPECIMENS EXAMINED:— *Java:* Without specific locality, Koorders No. 41055β, 10.7.1916 (BO 102274); Malang, G. Kavi, road near the Boelab, ca. 2,000 m. alt., in primary forest, Posthumus No. 3979, 9.1936 (BO 102290).

Timor: Moetu?, de Voogd No. 2354, 11.1935 (BO 102291).

ABSOLUTE SYNONYM: *Dryopteris subsparsa* v.A.v.R. in Bull. Jard. Buit., ser. 2, XX (1915 14.

This species has a superficial resemblance to *L. rufescens* but it differs from the latter by the presence of indusia, also the rhizome of *L. subsparsa* is erect instead of creeping.

16. Lastreopsis shepherdii (*Kze. ex Mett.*) *Tindale* in Vict. Nat. LXXIII (1957) 182; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961) 65; Willis, Handb. Pl. Vict. I (1962) 41.

Habitat terrestrial in subtropical and temperate rainforests mostly near creeks or amongst rocks, often in mountain gullies or in caves or mine-shafts. *Caudex* shortly creeping, thick, oblique, tufted, densely covered with the broken bases of the old stipes, 1·5 to 5 cm. broad, clothed with scales which are fairly persistent, very dark brown, thin, linear (12: 1 or more), narrowly lanceolate (6: 1) to narrowly ovate (2: 1), usually 2 to 7 mm. long and 0·3 to 0·8 mm. broad, the cells hexagonal to rectangular, thick-walled with dark red-brown lumina, the margin entire or with a few fimbriae and/or 1- to 5-celled processes each ending in a dark red, rounded, glandular head, the apex hair-pointed or in small scales often ending in a *Ctenitis*-hair. *Stipes* crowded on the rhizome, 10 to 55 cm. long, 1 to 2·5 mm. broad near the middle, pinkish-fawn, light brown, light purplish-brown, light yellow-brown or light red-brown, often dark red-brown at the base, glossy, smooth or often slightly scabrous near the base, the adaxial channel near the apex densely tomentose with *Ctenitis*-hairs, clothed near the base of the stipes with a few of the same type of scales as on the rhizome, the upper and middle regions glabrous. *Main rhachis* winged near the apex, pinkish-fawn, light red-brown, light yellowish-brown, brown or light brown, glossy and smooth below, shallowly furrowed on the upper surface, the channel and raised median band densely tomentose with *Ctenitis*-hairs which are more or less appressed, red-brown or brown, 3 to 6 cells long, with dark red articulations and reddish apical cells, the lower surface glabrous or almost so near the base, clothed near the apex and middle with red-brown or red hairs which are longer, finer and more spreading but with red articulations; scales and gemmiferous bulbils absent. *Fronds* including the stipes 25 to 90 cm. long. *Lamina* 17 to 55 cm. long, 6 to 30 cm. broad, 2-pinnate-pinnatifid to 3-pinnate, rarely 2-pinnate, anadromous except at the base, light green when living, herbaceous to sometimes very thinly subcoriaceous, narrowly lanceolate-quinquangular (6: 1) to ovate-quinquangular (3: 2), both surfaces glabrous or almost so between the veins; apex acuminate, often decurved. *Primary pinnae* stalked, the lower petiolules not winged, rather closely spaced, usually curved upwards, obliquely narrowly lanceolate (6: 1) to broadly ovate (6: 5), 3 to 21 cm. long, 1·5 to 10 cm. broad, 9- to 22-jugate; apex acuminate. *Secondary rhachises* densely clothed above with *Ctenitis*-hairs and below with longer, finer, more spreading hairs. *Secondary pinnae* with very narrowly winged petiolules in the lower pinnae, rather closely spaced, the basiscopic secondary pinna of the lowest pair of primary pinnae nearest the main rhachis 1·2 to 8 cm. long, 3- to 9-jugate, not much enlarged, lanceolate-rhomboidal (3: 1) to ovate-rhomboidal (3: 2) or narrowly ovate-deltoid (2: 1), others obliquely deltoid (6: 1) to obliquely oblong (2: 1), the bases decurrent, the margin thickened, the apex broadly rounded and spinulose-dentate. *Ultimate segments* with winged petiolules in the lower pinnae, closely spaced, alternate, erecto-patent, oblong-falcate, the margin rather sharply spinulose-dentate, not as prickly as in *L. munita*, the margin and apex thickened; apex broadly rounded. *Veins* prominent especially on the upper surface, free, the minor veinlets from the costules simple or several times dichotomously forked, not reaching the margin, anadromous in the ultimate segments, the costae clothed above with *Ctenitis*-hairs and below with finer, spreading, articulated hairs, the costules and minor veinlets glabrous or sparsely clothed. *Sori* indusiate, superficial, orbicular, large, 0·5 to 2 mm. in diam., half-way between the midrib and margin, medial on the simple minor veinlets or, slightly above or on the first fork of the branched minor veinlets, pustulate on the upper surface. *Indusium* 0·5 to 1 mm. in diam., reniform to almost peltate, membranous, somewhat persistent, dark brown (not purple), glabrous, the margin irregularly crenate, without glands. *Sporangia* small, flattened; pedicel long, narrow, often with 1 or rarely 2 oblong, yellow glands; annulus composed of 12 to 14 indurated cells and about 8 thin-walled cells including the lateral stomium. *Spores* bilateral, monolete, globoso-ellipsoidal, with a few crests on the perispore, equat. diam. 26·3 to 39·4 μ × polar diam. 20·6 to 30 μ, the wing very dissected, 1·9 to 5·6 μ in diam. *Glandular hairs* oblong, appressed, unicellular, mostly orange or yellow, very sparsely scattered along the costae, costules, minor veinlets and the surface of the fronds. (Plate X).

Distribution: Australia (Carnavon Range, Central Queensland, the coastal ranges of south-eastern Queensland, Tablelands and Coast of New South Wales, Victoria, South Australia and Tasmania).

Holotype: According to Christensen in Vict. Nat. LX (1944) 155, the type consists of two leaves of a cultivated plant (Hort. Berol.) which match perfectly a specimen from Bulga Creek collected by W. W. Watts in 1915. A photograph of this holotype, which is located in Christensen's Private Herbarium (BM), was kindly forwarded by the Keeper of Botany, British Museum of Natural History.

Specimens Examined:—*Queensland:* Carnarvon Ranges, Young 9.1938 (BRI 502-3); Upper Tallebudgera, White 12.1917 (BRI 525); near Lightning Falls turnoff in rainforest, alt. ca. 3,400 ft., terrestrial with tufted fronds, Smith No. 10918, 3.1960 (BRI 25758); Lightning Falls, Lamington National Park, alt. 2,000 ft., growing on bank of stream above falls, in heavy rainforest, fronds densely tufted, scales dark, scanty at the base of the stipes, Goy & Smith No. 172, 1.1938 (BRI 496; NSW P5472; BO 102297); Lamington National Park, Elabana Falls, West Canungra Creek, alt. ca. 2,600 ft., on bank of creek, in rainforest, Smith & Tindale, 8.1956 (NSW P7464); NE Slopes of Mt. Hobwee, in rainforest, ca. 1030 m. alt., Blake No. 20608A, 8.1959 (BRI 25862).

New South Wales: Tweed, Guilfoyle (BO 102264); Tweed (River), Audas 11.1902 (NSW P4415); The Dome, Dorrigo, in a rainforest gully, Tindale 4.1944 (CAIRNS); Styx River State Forest, in rainforest, Davis 10.1956 (NSW P7551); Warrumbungle Ranges, Forsyth 10.1899 (NSW P4407); Mt. Boss State Forest, 35 miles NW of Wauchope, erect spreading habit, common in dense rainforest on basalt hillside, Constable 10.1956 (NSW P7560; S; BR); Bulgong Heights, Watts 5.1916 (NSW P4401 and P4413); bed of a creek, back of Rose's Falling, Bulga Heights, via Wingham, Watts 4.1915 (NSW P1069 and P4393); gully leading down to Bulga Creek, above the falls, via Wingham, Watts 4.1915 (NSW P1071 and P4395); Upper William's River, in *Nothofagus* forest, about 4,000 ft. alt., Fraser & Vickery 5.1934 (NSW P4394); ditto, Fraser & Vickery 11.1936 (NSW P4397); Mt. Irvine, alt. 2,500 ft., in rainforest, basalt, Constable 3.1950 (NSW P6269); Happy Valley, Mt. Wilson, common along track in rainforest, basalt, Tindale & Constable 3.1952 (NSW P2037; BM; U; L; UC; S; LIL; BO; RB); ditto, Watts & Boorman 5.1915 (NSW P4391, P4392, P1072 and P1059); ditto, Watts 12.1914 (NSW P1065, P4403 and P1068); Waterfall Creek, Mt. Wilson, alt. 3,000 ft., on bank of creek, rainforest, Melville & Tindale 4.1953 (NSW P6388; BM; US; L; UC); Mt. Wilson, basalt, red volcanic loam, in rainforest, Constable 12.1948 (NSW P2071; US; P); Mt. Tomah, Maiden 11.1898 (NSW P4406); Govett's Leap, Blackheath, frequent at foot of falls, edge of rainforest, alt. 960 m., Constable 3.1957 (NSW P7884; KYO; A; K; US; SING); Jenolan Caves, Blakely (NSW P4410); Leura Falls, Stephenson (NSW P4399); bottom of Vera Falls, Valley of the Waters, Watts 12.1914 (NSW P1060 and P1073); Brittania Falls, Wentworth Falls, alt. 1650 ft., growing on rocks in creek, sandstone country, Constable 2.1949 (NSW P5654; MO; BM); Springwood, Blue Mountains, Watts 12.1914 (NSW P1066); National Park, Salasoo No. 774, 9.1951 (NSW P2842); Mt. Kembla, Fletcher, 11.1891 (NSW P4412 and P4396); ditto, Deane 11.1891 (NSW P1189); Minnamurra Falls, 3 miles W of Jamberoo, on bank along track, in rainforest, Melville & Tindale 4.1953 (NSW P6389); Belmore Falls, Forsyth 10.1900 (NSW P4404 and P4405); Saddleback Mountain, Kiama, 1650 ft. alt., Constable 1.1955 (NSW P7050; K; MO; US; P); Sugar Loaf Mountain, Monga, Boorman 9.1915 (NSW P4418); NE Slopes of Mt. Dromedary, Central Tilba, 1850 ft. alt., plentiful in rainforest, Constable 9.1953 (NSW P6651; SING; BO); Mt. Dromedary, Tilba Tilba, erect tufted fern, frequent in wet gully, rainforest on mountainside, alt. ca. 1,800 ft., Johnson & Constable 9.1960 (NSW P8148).

Victoria: Mt. Drummer, East Gippsland, Wakefield No. 1, 9.1939 (BRI 500-1); Orbost, Wakefield 5.1939 (CAIRNS); Upper Yarra, Staer 4.1911 (NSW P4422); Ferntree Gully, Staer 4.1911 (NSW P4423); Dandenong Ranges, E of Melbourne, in scrub along creek, Smith No. M98, 11.1943 (BRI 499); Dandenong Ranges, ½ mile E of Belgrave, near Hardy Creek, growing in clumps 12-18 inches high, Aston No. 591, 9.1960 (MEL; NSW); Lorne, Watts 11.1919 (NSW P4419).

Tasmania: Becford's Creek, Gunn No. 53 (NSW P4411); Hobart, Somerville 9.1940 (NSW P4425); side of Mt. Wellington, Lee ex Herb. Archer (NSW P4424).

Absolute Synonyms: *Aspidium shepherdii* Kze. in Linnaea XXIII (1850) 230, nomen nudum; Mett., Fil. Hort. Lips. (1856) 94 with a description; Mett., Aspid. und Pheg. (1858) 69; *Nephrodium shepherdii* Fée, Gen. Fil. (1852) 305, based on *Aspidium shepherdii* Kze.; *Dryopteris shepherdii* (Kze. ex Mett.) C. Chr. in Vict. Nat. LX (1944) 155.

Equivalent Synonyms: *Lastrea atrovirens* J. Sm., Cat. Cult. Ferns (1857) 59, non *Dryopteris atrovirens* C. Chr. in Christ, Bull. Boiss., II (1907) 263; *Ctenitis lowei* Copel., Gen. Fil. (1947) 124, based on *Dryopteris acuminata* Watts.

This species was known for many years as *Dryopteris acuminata* (Lowe) W. W. Watts which was published in the Proc. Linn. Soc. N.S.W. XLI (1916) 382. Christensen in Ind. Fil., Suppl. III (1934) 80, and Melvaine in the Proc. Linn. Soc. N.S.W. LXI (1936) 117, also used this name which was based on a misidentification dating back to Lowe who published an account of *Aspidium acuminatum* in Ferns Brit. and Exotic, VI (1857) pl. XI, but his species was based on an erroneous conception of Willdenow's plant of the same name. Lowe stated that the country of origin was rather doubtful but might be Nepal. The illustration of *A. acuminatum* leaves no doubt that this is the Australian fern now known as *Lastreopsis shepherdii*.

Dryopteris acuminata (Lowe) Watts var. *cristata* W. W. Watts in Proc. Linn. Soc. N.S.W. XLI (1916) 383, is merely a form in which the apices of the primary pinnae are forked. The holotype of this variety was collected at Happy Valley, Mt. Wilson, in the Blue Mountains of New South Wales by Watts & Boorman in May 1915 (NSW P4391) which I have examined in the National Herbarium, Sydney.

L. shepherdii, which is characterized by pale green, tufted fronds, is usually found in shady situations on the banks of creeks or growing amongst rocks near streams. In south-eastern Queensland it is found in the wetter type of subtropical rainforest i.e. in the McPherson Range rather than at Mt. Glorious. This Australian species is quite common in southern Victoria and in the deep, subtropical rainforest gullies of the Blue Mountains, N.S.W., but it has quite a wide range extending to the temperate rainforests near Hobart, Tasmania, and the Yallum Caves, South Australia.

Chromosome counts of $n = 41$ were made by Prof. I. Manton on material of *L. shepherdii* obtained by R. Melville No. 3834 at Lala Falls, Warburton, Victoria, and R. Melville No. 3784 & M. Tindale at Waterfall Creek, Mt. Wilson, N.S.W. (K). These counts were published with Prof. Manton's kind permission in Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961) 67.

This species is closely related to *L. smithiana* which has a much narrower range i.e. the mountains of SE Queensland as far north as Mt. Glorious and as far south as Mt. Lindsay on the border of New South Wales. *L. smithiana* is a larger fern with darker green, more finely dissected (3-pinnate-pinnatifid to 4-pinnate) fronds and indusia which are usually purplish on living plants. In both *L. shepherdii* and *L. smithiana* the chromsome number has been recorded as $n = 41$, whereas in the closely allied *L. glabella* of New Zealand, $n = 82$ has been counted by Brownlie (see page 297). In Ewart's Fl. Vict. (1931) 57, *L. shepherdii* is misdetermined as *Dryopteris glabella* (A. Cunn.) C. Chr. (i.e. *Lastreopsis glabella* (A. Cunn.) Tindale).

17. Lastreopsis glabella (*A. Cunn.*) *Tindale* in Vict. Nat. LXXIII (1957) 183; Crookes & Dobbie, N.Z. Ferns (1963) 246, pl. 247.

Habitat in lowland temperate rainforest in *Beilschmiedia-Podocarpus* forest, often on banks in shade or semi-shade. *Rhizome* erect, short, 1·5 to 5 cm. long, 1 to 2·5 cm. high, clothed with scales which are dark brown, dull, acuminate, linear (10: 1) to narrowly lanceolate (6: 1), 5 to 9 mm. long, 0·5 to 1 mm. broad at the base, the cells hexagonal with thick, dark brown walls and yellowish-brown lumina, the margin with long, sometimes glandular-tipped fimbriae. *Stipes* tufted, 6 to 35 cm. long, 0·5 to 2 mm. broad near the middle, fawn, light brown or pinkish fawn, dark brown near the base, glossy, smooth except scabrous towards the base, the adaxial channel densely tomentose with *Ctenitis*-hairs near the apex, clothed near the base with the same type of scales as on the rhizome, the upper and middle regions glabrous on the abaxial surface. *Main rhachis* with two prominent ridges on the adaxial surface, the raised median band and the shallow channel densely clothed with *Ctenitis*-hairs which are 2 to 5 cells long with dark red articulations and apical cells, the lower surface glossy, smooth, and glabrous especially near the base or clothed with a few, finer *Ctenitis*-hairs; scales and gemmiferous bulbils absent. *Fronds* including the stipes 15 to 55 cm. long. *Lamina* 15 to 35 cm. long, 5 to 25 cm. broad, 3-pinnate-pinnatifid at the base or rarely 3-pinnate in very small fronds, anadromous above, catadromous at the base, rather dark green, submembranous to herbaceous, lanceolate-quinquangular (3: 1) to ovate-quinquangular (3: 2), both surfaces glabrous except for an occasional *Ctenitis*-hair or glandular hair, the apex acuminate, often decurved. *Primary pinnae* stalked, the lower petiolules not winged, the lower pairs opposite and usually distant, the upper pairs subopposite or alternate and usually crowded, not falcate, the lowest pair basiscopically produced, 3 to 12 cm. long and 1·5 to 8 cm. broad, 9- to 15-jugate, obliquely lanceolate (3: 1) to ovate (3: 2), the apex acuminate. *Secondary rhachises* densely clothed above with *Ctenitis*-hairs, the lower surface sparsely clothed with a few, lax, 4- to 8-celled *Ctenitis*-hairs as well as spreading, 2- to 4-celled hairs with dark red septa. *Secondary pinnae* stalked, the petiolules winged except in the 2 basal pairs on the lowest primary pinnae, the basiscopic secondary pinnae of the lowest pairs of primary pinnae nearest the main rhachis much enlarged, usually 2·5 to 6·5 cm. long and 1·2 to 2·3 cm. broad, the apex acuminate, the other secondary pinnae much smaller, the apex subacute, ovate-rhomboidal (3: 2) to lanceolate-rhomboidal (3: 1), mostly slightly falcate. *Tertiary segments* with winged petiolules, lanceolate (3: 1) to narrowly ovate (2: 1), the apex acute, the margin very coarsely spinulose-dentate. *Veins* free, simple, pinnate or forked in the ultimate segments, not reaching the margin, fairly prominent, catadromous at the base, anadromous towards the apex, the lower surface of the costae, costules and minor veinlets very sparsely clothed with scattered, lax, 3- to 6-celled *Ctenitis*-hairs, the upper surface of the costae and costules more or less densely clothed with a tomentum of reddish-brown, 2- to 5-celled *Ctenitis*-hairs, the minor veinlets almost glabrous above. *Sori* indusiate, medial or submarginal, orbicular, borne near the middle of or towards the apex of simple veinlets or just above the fork of other minor veinlets, 0·5 to 1·5 mm. in diam., prominent. *Indusium* 0·5 to 1 mm. in diam., orbicular-reniform, with a closed sinus, firm, persistent, light brown with a darker centre or purplish-brown, entire or erose, glabrous or rarely with a round, glandular hair on the surface. *Sporangia* with a long narrow pedicel often bearing a stalked, oblong, orange gland, the annulus composed of 12 to 14 indurated cells and about 8 to 9 thin-walled cells, including the lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, light brown, the perispore densely sacco-rugulate, with dark, short, flaccid protuberances up to 10 μ long and 3·75 to 7·5 μ high, equat. diam. 28·13 to 43·13 μ × polar diam. 26·25 to 33·75 μ including the ridges. *Glandular hairs* oblong or round, appressed, unicellular, orange or yellow, scattered sparsely along the lower surface of the rhachises, costae, costules, minor veinlets and lamina, rarely occurring on the upper surface.

Distribution: New Zealand (North and South Islands). According to Allan, Fl. N.Z. (1961) 91, this species is also recorded from the Polynesian region but these references refer to a new species which I have described from that area (see *Lastreopsis pacifica* page 329). The material from the Kermadec Islands attributed by Allan to *L. glabella* also appears to be a distinct taxon.

Lectotype: Bay of Islands, North Island, New Zealand, shady woods, A. Cunningham 1826 (K), photograph seen.* This lectotype was chosen by Allan in Fl. N.Z. (1961) 91 but is located at the Kew Herbarium not at the British Museum of Natural History as stated by Allan. Syntype: in humid places at the heads of the Kana-Kana and Wycaddey Rivers, A. Cunningham 1834, not examined. Isotype: New Zealand, A. Cunningham 1827 (BM).

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* This photograph was kindly forwarded by courtesy of the Director, Royal Botanic Gardens, Kew.

Specimens Examined:—*New Zealand: North Island:* Thames Goldfields, 1,000 ft. alt., Brame 6.1924 (US 1371828); vicinity of Auckland, Cheeseman (NSW P7924); Waikowhai Park, Auckland, Hynes 11.1953 (AK 31438; NSW P7930); Pukeatua, in bush, West Taupo County, northern part, Petrie 11.1917 (NSW P7927); Kitchener Park, Fielding, Manawatu, in tawa-podocarp forest, Healy 9.1934 (CHR 33671); Boulder Hill, Hutt Valley, Wellington, in semi-shade, second growth bush, Harris 2.1948 (CHR 74763); Kelburn, Wellington, on dry clay bank, semi-shade, Rawson, 2.1952 (CHR 74800; NSW P7929); Khandallah, Wellington, Harris 1946 (NSW P7925); hillside, Old Karori Rd., Wellington, moist shady bank, Rawson 4.1952 (NSW P7926); hills behind Karori, Wellington, Atkinson 4.1922 (D.S.I.R. 2125).

South Island: Rangihaieta Headland, Takaka, Nelson Province, 150 ft. alt., bush remnant on top of headland, Lovis N.Z. No. 1255, 2.1956 (NSW P7921); Rameka Creek, Pikikiruna Range, Takaka, Nelson Province, 500 ft. alt., bush-clad slope above creek, Lovis N.Z. No. 1190, 2.1956 (NSW P7922); near Picton, Queen Charlotte Sound, Marlborough, sea level, coastal bush, Lovis N.Z. No. 702, 11.1955 (NSW P7920); Geraldine, Canterbury, Kennedy 5.1919 (NSW P7919).

Absolute Synonyms: *Nephrodium glabellum* A. Cunn. in Hook. Comp. Bot. Mag. II (1836) 367; *Lastrea glabella* (A. Cunn.) Houlst. et Moore in Gard. Mag. Bot. III (1851) 318; *Nephrodium decompositum* var. *glabellum* (A. Cunn.) Hook. f., Fl. N.Z. II (1855) 39; *Aspidium glabellum* (A. Cunn.) Lowe, Ferns Brit. & Exot. VI (1857) 93, 94, t. 32; *Dryopteris glabella* (A. Cunn.) C. Chr., Ind. Fil. (1905) 267; Cheeseman, Man. N.Z. Fl. (1925) 34; *Ctenitis glabella* (A. Cunn.) Copel., Gen. Fil. (1947) 124; Dobbie & Crookes. N.Z. Ferns (1952) 252, photo 253; Allan, Fl. N.Z. I (1961) 90; Harris in D.S.I.R. Bull. No. 116 (1955) 132, 44, pl. 9, f. 12.

Equivalent Synonym: *Nephrodium decompositum* R. Br. var. *microphyllum* Hook., Sp. Fil. IV (1862) 146.

A chromosome count of $n = 82$ has been recorded by G. Brownlie in Trans. Roy. Soc. N.Z. LXXXV (1958) 214, on material of *L. glabella* which was collected at Stewart Island, New Zealand. This count was published for *Ctenitis glabella* which I regard as a synonym of *L. glabella.*

18. Lastreopsis smithiana *Tindale* in Contrib. N.S.W. Nat. Herb. III (1961) 90; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 64.

Habitat in subtropical rainforests along creek banks often growing in the water or less commonly on the hillsides above the creeks. *Rhizome* tufted, ascending, oblique or erect, 2 to 4 cm. in diam., with a crown of fronds, the broken bases of the old stipes crowded and persistent, densely clothed with scales which are up to 7 mm. long and up to 1 mm. broad, linear (12: 1), narrowly lanceolate (6: 1) to lanceolate (3: 1), firm, dark brown with a narrow brown border, the cells thick-walled, the lumina brown, the margin shaggy with numerous, long, deflexed, glandular-tipped hairs. *Stipes* 10 to 55 cm. long, 0·5 to 4 mm. in diam. towards the centre, fawn, light brown or pinkish brown towards the upper and middle portions, dark brown near the base, the abaxial surface glossy and glabrous except near the base which is clothed with similar scales to those on the rhizome, the adaxial channel densely tomentose near the apex with 2-celled *Ctenitis*-hairs. *Main rhachis* very narrowly winged near the apex, fawn, pale stramineous or pinkish brown, the abaxial surface smooth and glabrous or almost so, very broadly and shallowly furrowed on the upper surface, the channel and median raised band densely tomentose with 2-celled *Ctenitis*-hairs; without gemmiferous bulbils. *Fronds* 10 to 95 (mostly 30 to 95) cm. long including the stipes, 12 to 45 cm. broad. *Lamina* 3-pinnate-pinnatifid to 4-pinnate, anadromous except near the base, quinquangular, herbaceous, dark green, slightly paler beneath, the apex acuminate and often decurved. *Primary pinnae* stalked, only the lowest petiolules not winged, distant, upcurved, the basal pair obliquely broadly ovate (6: 5) to obliquely narrowly lanceolate (6: 1), 4 to 28 cm. long, 3 to 22 cm. broad, 10- to 25-jugate, the apex acuminate but less serrated than in *L. shepherdii*, all pairs without a basiscopic secondary pinna arising from the main rhachis. *Secondary rhachises* shallowly furrowed on the upper surface, the raised portion in the channel densely tomentose with 2-celled *Ctenitis*-hairs, rarely with a few brown scales. *Secondary pinnae* with very narrowly winged petiolules in the lower pinnae, not closely spaced, without sessile basiscopic pinnules mostly adnate to the rhachis, the apex spinulose-dentate, the base narrowly decurrent, the basiscopic secondary pinna of the lowest pair of primary pinnae often much enlarged, 7 to 18 cm. long and 2 to 5 cm. broad, 12- to 15-jugate. *Ultimate segments* with winged petiolules, closely spaced, alternate, oblong-falcate or oblong-rhomboidal, the margin thickened and spinulose-dentate, the apex broadly rounded. *Veins* prominent especially on the lower surface, free, not reaching the margin, the minor veinlets from the costules simple or several times dichotomously forked, anadromous in the ultimate segments, the costae clothed above with 2-celled *Ctenitis*-hairs, glabrous or almost so beneath, the costules sparsely clothed with 2-celled *Ctenitis*-hairs on the adaxial surface, almost glabrous below or with a few, 3- to 5-celled hairs with red articulations, the minor veinlets usually glabrous above and below or with a few, scattered, 3- to 5-celled hairs below. *Sori* indusiate, superficial, orbicular, 0·8 to 2 mm. in diam., half-way between the margin and midrib, medial on the minor veinlets or borne above or on the first fork of the veinlets. *Indusium* 0·5 to 1·2 mm. in diam., orbicular-reniform, persistent, purplish, light brown or brown, often darker in the centre, glabrous, the margin entire or almost so, very rarely clothed with glandular oblong hairs, without acicular hairs. *Sporangia* with an annulus consisting of 12 to 14 indurated cells and 6 to 7 thin-walled cells including a lateral stomium, the pedicel long and slender, sometimes bearing a stalked, oblong, orange, glandular hair. *Spores* bilateral, monolete, globose-ellipsoidal or sometimes globular, pale yellow or light brown, ruguloso-saccate or with a crested perispore forming wavy ridges on the surface, equat. diam. 28·13 to 35·63 μ × polar diam. 26·25 to 30 μ, the wing 3·75 to 5·63 μ in diam. *Glandular hairs* oblong, appressed, unicellular, orange, sparsely scattered along the veins and rhachises.

DISTRIBUTION: Australia (Mountain ranges of south-eastern Queensland and the McPherson Range on the Queensland-New South Wales border).

HOLOTYPE: about 1 mile north-west of Mt. Glorious, south-eastern Queensland, growing almost in a creek at the bottom of a rainforest gully, L. S. Smith and M. Tindale, 1.8.1956 (NSW P7429). ISOTYPE (K).

SPECIMENS EXAMINED:—*Queensland:* about 1 mile NW of Mt. Glorious, in rainforest gully, along creekside, alt. ca. 1,800 ft., Smith & Tindale 8.1956 (NSW P7430; US); ditto, Smith & Tindale 5.1961 (NSW P8230); Moreton District, Upper Cedar Creek, near Mt. Glorious, rhizome tufted, growing amongst rocks beside the creek, in rainforest, Smith 1940 (BRI); Spring Creek Plateau (several miles E of the junction of the Great Dividing range and the McPherson Range), tufted fern growing on creek bank in rainforest, alt. about 3,100 ft., Goy & Smith No. 345, 5.1938 (BRI); Numinbah Valley, near Natural Bridge, large fern in rainforest near the creek, fronds 3-4 ft. long, sori very large, indusia purplish, rhizome tufted, Goy & Smith No. 538, 10.1938 (BRI; NSW P5714); Moran's Creek, Lamington National Park, alt. 1,500 ft., in rainforest at the foot of the falls, Goy & Smith No. 105, 1.1938 (BRI); Lamington National Park, in rainforest beyond Lightning Falls, turnoff from Bithongabel track, alt. ca. 3,400 ft., terrestrial fern with loosely tufted fronds, Smith No. 10921, 3.1960 (BRI 25786-7); Lamington National Park, McPherson Range, NE Slopes of Mt. Hobwee in rainforest, ca. 1,030 m. alt., rhizome short, fronds approximate, loosely tufted, dark shining green above, paler and duller beneath, Blake No. 20608, 8.1959 (BRI 25863; NSW); McPherson Range, White 12.1915 (NSW P4845).

Queensland-New South Wales Border: Mt. Lindsay, alt. 3,500 ft., plants erect, 2 to 3 ft. high, basalt, plentiful on the summit, Constable 11.1952 (NSW P6500).

L. smithiana has obvious affinities with *L. shepherdii* but the spinulose-dentate margin of the ultimate segments and the finely dissected lamina are reminiscent of *L. microsora*. It might be expected that *L. smithiana* could be a hybrid between these two species especially as their ranges overlap to a certain extent, i.e. from south-eastern Queensland to the border of New South Wales. Mr. L. S. Smith and I made a field trip to Mt. Glorious to examine the localities in which *L. smithiana* is fairly abundant. After an extensive search *L. shepherdii* was not found there, although *L. microsora* was plentiful on the hillsides about 20 to 30 yards above the creeks in the rainforest gullies. *L. smithiana* was restricted to a zone about 10 yards wide on either side of the creeks. In other parts of the Mt. Glorious Reserve *L. marginans* is quite common but it is very dissimilar to *L. smithiana* and would be a most unlikely parent of this fern if it were a hybrid.

L. smithiana is one of the larger Australian species of this genus and it is usually found close to creeks growing almost in the water. A distinctive feature of this species is the often purplish colour of the indusia which is very marked in living specimens. *L. smithiana* and its allies *L. shepherdii*, *L. glabella* and *L. subsparsa* lack gemmiferous bulbils near the apices of the main rhachises.

A chromosome count of $n = 41$ was obtained by B. G. Briggs and M. Tindale for cultivated material of *L. smithiana* which was originally collected at Mt. Glorious, SE Queensland, by L. S. Smith and M. Tindale in May 1961. The voucher specimen is labelled " Neutral Bay, N.S.W., cultivated, M. Tindale 5.1962 (NSW P8454) ".

There are several specimens of *Lastreopsis* which are rather similar to *L. smithiana* but the lower surfaces of the secondary rhachises are slightly pubescent. Unfortunately none of these specimens which were collected in the McPherson Range and at Upper Tallebudgera, south-eastern Queensland, have rhizomes but it is hoped that better material may be obtained at a later date.

19. **Lastreopsis effusa** (*Sw.*) *Tindale* in Vict. Nat. LXXIII (1957) 184.

Three new combinations are necessary in this species, viz.:—**Lastreopsis effusa** (*Sw.*) *Tindale* ssp. **dilatata** (*Liebm.*) *Tindale* **comb. et stat. nov.** (BASIONYM: *Polypodium dilatatum* Liebm. in Vid. Selsk Skr. V (1849) 208); **Lastreopsis effusa** (*Sw.*) *Tindale* ssp. **divergens** (*Willd.*) *Tindale* **comb. et stat. nov.** (BASIONYM: *Polypodium divergens* Willd. in Schkuhr, Kr. Gew. (1806?) 27, t. 26b); **Lastreopsis effusa** (*Sw,*) *Tindale* ssp. **confinis** (*C. Chr.*) *Tindale* **comb. et stat. nov.** (BASIONYM: *Dryopteris effusa* (Sw.) Urban var. *confinis* C. Chr., Monogr. *Dryopteris* II (1919) 1920, 101).

Key to the Subspecies

1. Fronds herbaceous to firm, 3-pinnate to almost 5-pinnate, dark, dull or dull greyish green.
    2. Yellow, orange or red, glandular hairs very numerous on the lower surface of the lamina. Rhachises usually glabrous but sometimes pubescent on the lower surface. Fronds dark green, herbaceous, 3-pinnate to almost 5-pinnate .. .. ssp. *effusa* a.
    2.* Yellow, orange or red, glandular hairs absent or sparsely scattered along the veins. Rhachises glabrous or more often shortly pubescent on the lower surface. Fronds firm.
        3. Fronds dark green, 4-pinnate to 4-pinnate-pinnatifid. Secondary pinnules more dissected than in ssp. *divergens* .. .. ssp. *dilatata* b.
        3.* Fronds dull greyish-green or dark green, 3-pinnate, 3-pinnate-pinnatifid to 4-pinnate-pinnatifid. Secondary pinnules with a broad uncut centre .. .. ssp. *divergens* c.

1.* Fronds chartaceous or subcoriaceous, mostly 2-pinnate-pinnatifid to 3-pinnate, sometimes 3-pinnate-pinnatifid or rarely 4-pinnate, dull green, usually 40 to 60 cm. high including the stipes. Secondary rhachises mostly glabrous. Reddish or orange, glandular hairs usually present along the veins and sometimes on the surface of the lamina .. .. ssp. *confinis* d.

The basic work on the above subspecies of *L. effusa* was carried out by Christensen in his Monogr. Dry. II (1919), 1920, 98. As he indicated, there are a number of intermediate forms between these geographic segregates. However a great deal of material has been obtained since 1919, so that I have endeavoured to incorporate much of the recently collected material under my subspecies.

a. L. effusa ssp. **effusa**

Reference is made here to Christensen's excellent description of the type subspecies in his Monogr. Dry. II (1919) 1920, 97:

" Rhizome strong, short-creeping, sometimes branched, at the apex clothed with several large, ovate or lanceolate, subentire or faintly toothed, generally appressed, yellow-reddish or brown, opaque, thin scales. Stipites approximate, up to 1 cm. thick and 50-100 cm. long, brownish or stramineous, below with some deciduous, ovate or lanceolate, rather large, thin scales, upwards as a rule naked and quite glabrous. Lamina deltoid, probably reaching one meter in length and breadth, thinly herbaceous to chartaceous, fresh green and shining above, 4-pinnate-5-pinnatifid, sometimes 6-pinnatifid below, smaller forms 3-pinnate. Rachises of I-III order glabrous beneath, or, sometimes, stalks of secondary and tertiary pinnae with several, patent, articulated hairs, above with a broad channel which is filled with a dense mass of very short, reddish hairs; primary rachis, rarely also the secondary, often with a scaly bud in the axil of an upper pinna. Midribs of quaternary (tertiary) pinnae above shortly glanduloso-pubescent, upper surface otherwise glabrous. Underside glandulose by scattered, short, cylindrical, red, shining, glandular hairs. Pinnae alternate, the basal ones the largest, up to 50 cm. long, their lower side considerably produced; middle and upper pinnae oblong, acuminate. Secondary pinnae stalked, ovate-oblong, acuminate, somewhat unequal-sided, the anterior side being a little broader. Tertiary pinnae of upper pinnae (or quaternary pinnae of basal primary pinnae) with a winged, short petiole, oblong, 1-2 cm. long, ½-1 cm. broad, the anterior basal one always the largest, all decurrent at the base, forming a distinct wing along the midrib of the secondary (or tertiary) pinnae, their apices sharply acute, the margins more or less deeply pinnatifid into oblique or falcate, close, acute lobes, these entire or toothed, the larger ones shallowly lobed. Veins simply pinnate in the lobes, terminating shortly within the margin. Sori near the tip of the ultimate lobes, small, reddish, exindusiate; receptacle with several shining red glands among the sporangia, which bears on its pedicel a rather large capitate, stipitate gland. Spores coarsely verrucose."

To the above description I would add that the spores are mostly verrucose but sometimes ruguloso-saccate and occasionally with one long crest amongst the short protuberances. The equatorial diameter of the spores mostly ranges from 26·25 to 37·5 μ and the polar diameter 20·63 to 26·25 μ, the protuberances varying from 1·88 to 5·63 μ high.

Distribution: Jamaica, Puerto Rico, Dominican Republic and Surinam.

Lectotype: Jamaica, Swartz (B). Syntype: Jamaica, Swartz (C; UPS), examined.

Specimens Examined:—*Jamaica:* Spur of John Crow Mountains opposite Mill Bank, Portland, on wet rocky slope, in deep forest, alt. 450-625 m., Maxon No. 9356, 6.1926 (GH); Parish of St. Ann, Reynolds Mine area, near Lydford P.O., in woods growing in deep shade, Howard & Proctor No. 13978, 9.1954 (A); Farm Hill, Orcutt No. 3468, 10.1927 (GH); Mt. James and vicinity, St. Andrews, alt. about 450 m., Maxon No. 8540, 5.1926 (GH); above Cedar Valley, along the parochial road to Silver Hill Gap, alt. 600-950 m., Maxon No. 10311, 7.1926 (GH); ½ mile N of Bath Fountain, along Sulfur River, alt. ca. 500 ft., Parish of St. Thomas, abundant in woods along stream, Wilson No. 567, 8.1954 (A); Vicinity of Mill Bank, Portland, alt. 200-300 m., Maxon & Killip No. 152, 2.1920 (GH); Blue Mountains, Trafalgar, Perkins No. 1164, 5.1916 (GH); Parish of St. Thomas, Corn Puss Gap, montane rainforest on metamorphic rock, alt. 2,000-2,300 ft., terrestrial in moist narrow gulch, Wilson & Webster No. 467, 6.1954 (A); Clyde Stream, 4,600 ft. alt., Watt No. 61, 3.1909 (NSW); without specific locality, Wilson (B; NSW).

Puerto Rico: Jayuya, alt. 900 m., in forest, Sargent No. 3123, 9.1943 (GH); Cayey, in sylvis ad flumen circa " Matonabajo ", P. Sintensis No. 2135, 10.1885 (B; GH); on the Adjuntas Road, 8 miles from Ponce, Heller No. 6254, 12.1902 (GH); without specific locality, Schwanecke (GH).

Dominican Republic: Prope Constanza, 1200 m., in sylvis, von Türckheim No. 2977, 2.1910 (GH), (this specimen is very close to ssp. *confinis*); Prov. Barahona, in sylvis Pae Mingo, 1,400 m. alt., Fuertes No. 1536, 4.1912 (GH), (this specimen has few glands but glabrous rhachises).

Absolute Synonyms: *Polypodium effusum* Sw., Prodr. Fl. Ind. Occ. (1788) 134; *Nephrodium effusum* (Sw.) Bak., Syn. Fil. (1868) 287; Jenman in Bull. Bot. Dept. Jamaica n.s. 3 (1896) 111; Jenman, W. Ind. & Guiana Ferns (1908) 225; *Dryopteris effusa* (Sw.) Urban, Symb. Ant. IV (1903) 16; C. Chr., Monogr. Dry. II (1919) 1920, 97; *Parapolystichum effusum* (Sw.) Ching in Sunyatsenia V (1940) 239; *Ctenitis effusa* (Sw.) Copel., Gen. Fil. (1947) 124.

The type subspecies is common in Jamaica where, according to Jenman, it occurs from the lowlands to 5,000 ft. altitude but only the plants found at high elevations produce gemmiferous bulbils.

b. L. effusa ssp. **dilatata** (*Liebm.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1964) 299.

This subspecies which is intermediate between ssp. *effusa* and ssp. *divergens* is characterized by few, yellow to reddish, oblong, glandular hairs on the lower surface of the lamina as well as on the secondary and tertiary rhachises. It is very close to ssp. *effusa*, some specimens being difficult to separate from the latter. The lamina is similar to ssp. *effusa* but sometimes firmer. However, unlike most fronds of ssp. *effusa*, the secondary to quaternary rhachises are pubescent. On the other hand the few glands and pubescent rhachises are similar to those of ssp. *divergens*.

Distribution: Mexico, Cuba, Guatemala, Panama, Haiti, Ecuador, Colombia and Costa Rica.

Holotype: Mirador, Mexico, Liebmann No. 2674 (C), examined.

Specimens Examined:—*Mexico:* Zacuapan and vicinity, Barranca de Tenampa, State of Vera Cruz, Purpus No. 1979,[*] 9.1906 (GH); Zacuapan, in rocky damp forests, Purpus No. 3008, 1.1908 (GH); Valleé de Cordoba, Bourgeau No. 2012, 3.1866 (GH); County of Cordova, State of Vera Cruz, Fink No. 64, 1889-91 (GH); Finca Irlanda, Chiapas, Purpus No. 6869, 6.1914 (GH); Sierra Madre, frondes de 40 cm., forêt humide, 1,200 m. alt., Langlassé No. 900, 2.1899 (GH); Hgo, ravine in tropical forest, Kenoyer & Crum No. 3981, 4.1948 (GH); Canton de Cordoba, Vera Cruz, alt. 1,200 m., Conzatti & Gonzales Nos. 572 and 572½, 12.1897 (GH).

Cuba: Oriente, Sierra de Nipe, Loma de Estrella prope Rio Piedra, in sylva solo calcareo, Ekman No. 1751, 7.1914 (GH); Oriente, northern spur of Sierra Maestra, west of Río Yao, alt. 300-700 m., Morton & Acuna No. 3376, 10.1941 (GH; US).

Haiti: Vicinity of Jean Rabel, short caudex, border of thicket, mountain, south of town, Leonard & Leonard No. 13069, 1-2.1929 (GH).

Panama: San José Island, Perlas Archipelago, Gulf of Panama, ca. 55 miles SSE of Balboa, Johnston No. 465, 11.1944 (GH) (yellow glands are very numerous on the lower surface of this specimen); Camp Valley, San José Island, on wet clay banks along stream in dense rich bottom-land forest, Johnston No. 261, 10.1944 (GH), see also p. 302.

Guatemala: Dept. of Suchitepequez, Finca Mocá, 3,000 ft. alt., Hunnewell No. 14598, 2.1937 (GH).

Ecuador: Rio Suguibi, 800 m. alt., Rimbach, Rosenstock exsicc. No. 41, 1907 (US; NSW).

Absolute Synonym: *Polypodium dilatatum* Liebm., in Vid. Selsk Skr. V (1849) 208.

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[*] cf. *L. effusa* ssp. *divergens*

EQUIVALENT SYNONYM: *Dryopteris ulvensis* Hieron. in Hedwigia, XL (1907) 346, t. 7, f. 18. HOLOTYPE: Ulva, near Baños, Ecuador, Stübel No. 848 (B), photograph examined. This photo was forwarded by courtesy of the Director, Berlin Herbarium. ISOTYPES: US; NSW.

c. L. effusa ssp. **divergens** (*Willd.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1964) 299.

In Monogr. Dry. II (1919) 1920, 98, Christensen considered that this was the best marked form of *L. effusa* (or *Dryopteris effusa* as this species was known at that time). The broad uncut central portion of the secondary pinnules is a distinctive feature of ssp. *divergens*. The less dissected lamina, except in some Brazilian specimens, gives this subspecies a different habit from ssp. *effusa* and ssp. *dilatata* which are more finely cut; whereas ssp. *confinis* resembles it in many ways but is a smaller island form. *L. effusa* ssp. *divergens* has dull, greyish-green, firm fronds which are usually 3-pinnate to 3-pinnate-pinnatifid but sometimes 4-pinnate-pinnatifid. Yellow or orange, glandular hairs are few or absent but mostly occur along the veins. The secondary and tertiary rhachises are usually pubescent on the lower surface. (Plate XXI).

Christensen referred the Brazilian material of *L. effusa* to *Lastrea grandifolia* Presl, Epim. Bot. (1851) 39. However, Presl did not cite a type specimen for his species but merely stated that the distribution was Brazil. I have not examined any material upon which Presl may have based his species. He described *L. grandifolia* as indusiate but I have only seen exindusiate material of *L. effusa*. I consider that all the Brazilian material of *L. effusa* should be referred to ssp. *divergens*, as it is not sufficiently distinct to be considered as a subspecies based on *Lastrea grandifolia*.

Most of the Brazilian specimens have dark green, coarse laminas. The broad uncut centre of the secondary pinnules gives them a characteristic appearance. There is often a gemmiferous bulbil towards the apex of the lamina. Some of the Brazilian specimens are characterized by a lighter green, thinner lamina. They are as follows:— Parahyba, Goeldi 1885 (BO 102278); Rio de Janeiro, Wilkes (GH); Ignape, São Paulo, Brade No. 8352, 1922 (US; NSW); trail between Sylvestre and Paineiras, Rio de Janeiro, Federal District, 200-400 m. alt., L. B. Smith No. 2254, 4.1929 (GH).

DISTRIBUTION: Guatemala, Honduras, Panama, Martinique, St. Vincent, Grenada, Trinidad, Dominican Republic, Costa Rica, Cuba, Colombia, Venezuela, British Guiana, Ecuador, Bolivia, Peru, Brazil and Paraguay.

HOLOTYPE: Caracas, Bredemeyer (Herb. Willd. No. 19725), (B), photograph examined. Photo forwarded by the courtesy of the Director, Berlin Herbarium.

SPECIMENS EXAMINED:—*Guatemala:* Pansamalá, Depart. Alta Verapaz, alt. 4,000 pp., von Türckheim No. 1052, 9.1886 (GH); Cubilquitz, Depart. Alta Verapaz, alt. 350 m., von Türckheim No. 7729, 4.1900 (GH); Volcan Tecuamburro, Depart. Santa Rosa, alt. 6000 pp., Heyde & Lux No. 4682, 2.1893 (GH); Alotenango, Salvin (K; GH).

Cuba: directly south of Jaguey, Yateras, Oriente, alt. 420 to 510 m., mountain slope, Maxon No. 4232, 4.1907 (US; GH); prope villam Monte Verde dictam, Cuba Orientali, margin of creek, Wright No. 831, 1-7.1859 (GH); in Cuba Orientali, Wright No. 831, 1859, 1860 (GH).

Honduras: near El Achote, in wet ravine, hills above the plains of Siguatepeque, 1,350 m. alt., Yuncker, Dawson & Youse No. 6095, 7.1936 (GH).

Panama: San José Island, Perlas Archipelago, Gulf of Panama, Camp Valley, wet clay banks along stream in dense rich bottom-land forest, Johnston No. 261*, 10.1944 (NSW).

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* cf. Johnson No. 261 (GH) which is *L. effusa* ssp. *dilatata*.

Costa Rica: Region of Zarcero, on hillside in forest shade, fronds up to 4 ft. high, flat and thin, stems green to dull brown, Austin Smith No. 87, 9.1937 (GH), (borderline with ssp. *dilatata*).

Dominican Republic: Vicinity of Piedra Blanca, Prov. La Vega, in heavy woods along Maimon River, 200-500 m. alt., Allard No. 14718, 1.1946 (US; NSW).

Trinidad: Fendler No. 45, 1878-1880 (NSW); Fendler No. 45, 1877-8 (GH); Maqueripe, on shaded hillside, Britton, Coker & Rowland No. 203, 3.1920 (GH; NY); Cama Road, gully, Broadway 5.1928 (GH); Gourlie, Herb. T. Moore (K; GH).

Colombia: Sierra de Santa Marta, H. H. Smith No. 1021, 1898-9 (US; NSW); in forest about 7 km. E of Codazzi, Magdalena, alt. ca. 300 m., stipes about 80 cm. high, adventitious bud towards the apex of frond, Haught No. 3765†, 10.1943 (US; NSW); Eastern Cordillera, Dept. Santander, Vicinity of El Roble, alt. ca. 1,500 m., woods along stream, Killip & A. C. Smith No. 19367, 2.1927 (GH).

Venezuela: Tovar, Fendler No. 205, 1854-5 (GH).

British Guiana: Northwestern slopes of Kanuku Mountains, in dense forest, 150-400 m. alt., in drainage of Moku-moku Creek, Takutu tributary, A. C. Smith No. 3553, 3-4.1938 (GH; NY).

Bolivia: Mapiri, 1,600 ft. alt., Williams No. 1273, 9.1901 (GH; NY; US); Santa Buena Ventura, 1,400 ft., Williams No. 1261, 11.1901 (GH; NY).

Brazil: Federal District, Brook trail between Paineiras and Jardim Botânico, Rio de Janeiro, alt. 100-400 m., L. B. Smith No. 1425, 12.1928 (GH); State of Minas Geraes, Viçosa Agricultural College land, north slope of Barbado, cut-over wood in dense shade, length of fronds up to 1½ m., Mexica No. 4615, 4.1930 (GH); S. Salvador, Rio Grande do Sul, Leite No. 2309 (139), 1.1942 (GH); State of Minas Geraes, Viçosa, Fazenda de Deserto, Burraca Frio, cut-over woods, frequent in open colonies, 700 m. alt., Mexica No. 4684, 5.1930 (GH); Viçosa, Agricultural College Land, road to San Miguel, about km. 3, small gulch, dense shade, alt. 675 m., Mexica No. 4478-a, 3.1930 (GH); without specific locality, Riedel No. 153, ex herbario horti Petropolitani (GH).

ABSOLUTE SYNONYMS: *Polypodium divergens* Willd., Schkuhr, Kr. Gew. (1806?) 27, t. 26b; Willd., Sp. V (1810) 209; *Phegopteris divergens* (Willd.) Fée, Gen. Fil. (1852) 243; *Dryopteris effusa* (Sw.) Urban var. *divergens* (Willd.) Hieron. in Engl. Jahrb. XXXIV (1905) 447; C. Chr. in Monogr. Dry. II (1919) 1920, 99-100; *Ctenitis effusa* (Sw.) Copel. var. *divergens* (Willd.) Proctor, Checklist Jam. Pterid. (1953) 18; *Parapolystichum effusum* (Sw.) Abbiatti var. *divergens* (Willd.) Abbiatti in Rev. Mus. de la Plata, IX, Bot. No. 37 (1958) 19, Pl. IV, f. 1 a & b (anatomical sections).

d. **L. effusa** ssp. **confinis** (*C. Chr.*) *Tindale* in Contrib. N.S.W. Nat. Herb, III (1964) 299.

This subspecies has a small lamina usually 20 to 40 cm. in length, with the basal pinnae mostly 10 to 15 cm. long. The fronds are usually 2-pinnate-pinnatifid to rarely 4-pinnate, dull green, subcoriaceous to chartaceous, often with an attenuated apical portion bearing a scaly bud just below the apex on the main rhachis. The lower surface of the lamina may be glabrous or sometimes the rhachises may be pubescent below as in *L. effusa* ssp. *divergens*, whereas other specimens may have numerous, reddish, oblong glands scattered between and along the veins. This subspecies appears to be restricted to the West Indies and is close to ssp. *divergens* which has larger fronds. (Plate XXII).

DISTRIBUTION: West Indies (Cuba, Haiti and Dominican Republic).

LECTOTYPE: Santa Ana, about 6 miles north of Jaguey, Oriente, Cuba, forest slopes 600-625 m. alt., Maxon No. 4185, 25.4.1907 (US 522903). This was chosen as the lectotype on personal advice from C. V. Morton, Curator of Ferns, Smithsonian Institution, U.S.A., since he has an intimate knowledge of Maxon's collections. Maxon segregated a number of specimens which he labelled " *Dryopteris confinis* " in the Smithsonian Institution but he did not publish this name.

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† With affinities to ssp. *dilatata*.

SPECIMENS EXAMINED:—*Cuba:* Slopes and summit of El Yunque, near Baracoa, Santiago Province, alt. 1,000 to 2,000 ft., Pollard and Palmer No. 161, 1.1902 (GH); in Cuba Orientali, Wright No. 831, 1859-60 (GH), 1865 (GH) and 1856-7 (GH); prope villam Monte Verde dictam, Wright No. 831, 1-7.1859 (GH), partly; " Glen Ames ", Buenos Aires, Trinidad Hills, Province of Santa Clara, 2500-3500 ft. alt., Jack No. 7223, 4.1929 (GH); Trinidad Mountains, in open field, far E side of Buenos Aires plateau, Howard No. 5233, 6.1941 (GH); La Prenda, Hioram No. 50005, 12.1921 (GH); Mountains near El Guama, Prov. Pinar del Rio, Palmer & Riley No. 401, 3.1900 (US; NSW); Loma del Gato, Hioram No. 6458, 8.1923 (GH), thick frond only, upper slopes and summit of Gran Piedra, Oriente, alt. 900 to 1200 m., Maxon No. 4053, 4.1907 (US; GH).

Haiti: Vicinity of Furcy, ravines, alt. about 1,300 m., Leonard No. 4712, 5-6.1920 (GH); Vicinity of Mission, Fonds Varettes, alt. ca. 1,000 m. and above, Leonard No. 3881, 4-5. 1920 (GH).

Dominican Republic: Polo, Provincia de Barahona, alt. 600-1,300 m. or less, Abbott No. 1842, 2-3.1922 (US; GH); Old Heart River, Yato Viejo, Samaná Peninsula, alt. 300 m., Abbott No. 1416, 4.1921 (US; GH); Vicinity of Laguna, Samaná Peninsula, chiefly on the Pilón de Azúcar, alt. 100 to 500 m., Abbott No. 266, 12.1920 (GH; US); Lajana, Samaná Peninsula, alt. about 100 m., in heavy forest, Abbott No. 1196, 3.1921 (GH).

ABSOLUTE SYNONYM: *Dryopteris effusa* (Sw.) Urban var. *confinis* C. Chr., Monogr. Dry. II (1919), 1920, 101.

20. Lastreopsis subrecedens *Ching* in Bull. Fan Mem. Inst. Biol., Bot. Ser. VIII (1938) 160.

This species is very closely allied to *Lastreopsis tenera* (R. Br.) Tindale (syn. *L. recedens* (J. Sm. ex T. Moore) Ching) but differs from the latter in that the lamina is eglandulose, also the secondary rhachises, costae and costules are pilose with long, whitish, acicular, 5- to 7-celled hairs. According to Ching, l.c. 161, the plants are smaller than in *L. tenera* and the sori are exindusiate. In the pinna which I have examined, the sori are old and any indusia would have been shed, even if originally present. In the Formosan material of *L. tenera* the indusia tend to shrivel very early and are often difficult to find.

DISTRIBUTION: Hainan Island (off the coast of south-west China).

HOLOTYPE: Hainan Island, east of Fan Ta, Hung Mo Mountain, by a large streamside, W. T. Tsang No. 17929, 30.6.1929 (PE). A fragment of the holotype was very kindly forwarded to me for examination by Dr. R. C. Ching.

According to Dr. Ching (in correspondence) there is only one specimen of *L. subrecedens* (i.e. the holotype) in the Academia Sinica, Peking, China. This species is still comparatively unknown and is unrepresented in most of the major herbaria of the world.

21. Lastreopsis wurunuran (*Domin*) *Tindale* in Vict. Nat. LXXIII (1957) 183.

Habitat on hillsides in the drier tropical rainforests, in damp gullies, mostly growing in deep leafmould, on basalt. *Rhizome* long-creeping, branched, 0·5 to 0·8 cm. in diam., clothed with squamules which are dark brown, almost orbicular to very broadly ovate, 0·2 to 1 mm. long, up to 0·5 mm. broad, the margin with numerous, short, sometimes glandular processes. *Stipes* 0·2 to 0·5 cm. apart on the rhizome, the broken bases persistent, 15 to 40 cm. long, 1·5 to 2 mm. in diam. near the middle, light brown, not winged, glossy, scabrous to almost smooth, grooved on the upper surface, the lower surface glabrous or almost so, towards the base densely pilose with hairs which are up to 4 mm. long, fawn or stramineous, spreading, soft, 4- to 12-celled as well as squamules similar to those on the rhizome. *Main rhachis* winged towards the apex with the decurrent bases of the pinnae, light brown or fawn, the lower surface dull to slightly glossy, almost glabrous towards the base, shortly pilose with soft, spreading, acute or glandular-tipped, 4- to 10-celled, fawn hairs especially towards the apex, also sometimes with a few, dark brown scales; the upper surface densely and shortly pilose in the channel and on the raised central portion with soft, often glandular-tipped, 7- to 10-celled hairs together with stiffer, more spreading, 3- to 5-celled hairs on the ridges, adnate displaced pinnules occurring towards the apex of the main rhachis, not gemmiferous by scaly buds. *Fronds* including the stipes 30 to 70 cm. long. *Lamina* 16·5 to 40 cm. long, 6 to 28 cm. broad, 3-pinnate or sometimes 3-pinnate-pinnatifid in large fronds, catadromous throughout or almost so, dull green, herbaceous, quinquangular, the apex acuminate, both surfaces glabrous or clothed with few to numerous, spreading, whitish, 3- to 4-celled hairs each often with a round, glandular, apical cell. *Primary pinnae* 12 to 16 pairs, the petiolules not winged except towards the apex of the lamina, up to 1 cm. long and pilose, the pinnae usually upcurved, the basal pair much enlarged and basiscopically produced, 9 to 22 cm. long, 4·5 to 12 cm. broad, obliquely narrowly ovate-deltoid (2: 1) to ovate-deltoid (3: 2), the apex acuminate and coarsely serrate. *Secondary rhachises* clothed densely on the lower surface with fine, spreading, whitish or brownish, 3- to 12-celled, often glandular-tipped hairs as well as a few, dark brown, linear to broadly ovate scales and a few, lax, dark reddish, 6- to 10-celled *Ctenitis*-hairs, the upper surface densely clothed towards the apex and middle on the raised portion and ridges with brownish, coarser, more appressed, 3- to 7-celled, substrigose hairs but the hairs longer, finer and more spreading towards the base of the secondary rhachises. *Secondary pinnae* stalked in the 2 basal pairs on the lower primary pinnae, otherwise sessile with a displaced pinnule adnate to the secondary rhachises, the lower pairs obliquely narrowly lanceolate (6: 1) to lanceolate (3: 1), the apex acuminate towards the apex and middle, the other pinnae obliquely narrowly oblong (3: 1) to broadly oblong (3: 2), the apex acute to obtuse. *Tertiary pinnae* with winged, pilose petiolules, sometimes dissected to the base into quaternary pinnae, the lower pair usually 1 to 2 cm. long, 0·4 to 1 cm. broad, obliquely cultrate (6: 1) to oblong (2: 1) or obliquely lanceolate-narrowly oblong (3: 1), the apex subacute to obtuse, the margin entire to obscurely crenulate. *Veins* free, simple, forked or pinnate in the ultimate lobes, not prominent, catadromous, not reaching the margin, the costae, costules and minor veinlets densely to sparsely clothed with spreading, whitish, 3- to 6-celled, acute or sometimes glandular-tipped hairs in addition to a few, scattered, lax, reddish, 5- to 10-celled *Ctenitis*-hairs on both surfaces. *Sori* exindusiate, orbicular, usually comparatively small, i.e. 0·2 to 0·8 mm. in diam., medial or submarginal, supramedial or medial on simple veinlets or almost terminal on the acroscopic branchlet of forked veinlets. *Sporangia* with a narrow pedicel mostly bearing 1 or 2 stalked, oblong glands, the annulus composed of 13 to 15 indurated cells and about 8 or 9 thin-walled cells including the lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, brown, covered with rounded, minutely tuberculate protuberances which are 3·75 to 7·5 μ in diam., equat. diam. 37·5 to 41·25 μ × polar diam. 26·25 to 33·75 μ. *Glandular hairs* oblong, appressed, unicellular, rarely scattered along the costae but common on the pedicels of the sporangia.

DISTRIBUTION: Australia (north-eastern Queensland).

HOLOTYPE: North-eastern Queensland, Wurunuran (Wooroonooran), in rainforest, ca. 100-150 m. alt., Domin 12.1909. Unfortunately I have seen neither the holotype nor a photograph but Domin's latin diagnosis agrees well with the population to which I have referred as *L. wurunuran*.

SPECIMENS EXAMINED:—*Queensland:* Daintree River, on rainforest floor, Brass No. 2239, 3.1932 (BRI); ditto, along creek, opposite Mission in damp gully, Messmer 7.1954 (NSW P6830; UC; U); ditto, in dry rainforest on steep hillside, in heavy leafmould, Messmer 7.1954 (NSW P6859; K; US; MEL); ditto, on dry hillside, in rainforest, Messmer 7.1954 (NSW P8358); Upper Mossman River, in jungle, Flecker 9.1936 (CAIRNS 2358); Kuranda, Copland King

(NSW P1057); Black Mountain-Kuranda Road, in rainforest along a creek, Messmer 8.1952 (NSW P6831 and P2770); Black Mountain Road, Kuranda, in rainforest, deep leafmould, Messmer 7.1954 (NSW P6860; US; A; U); Railway Cutting, between Redlynch and Stoney Creek, Watts 7-8.1913 (NSW P4844); Stoney Creek, near Cairns, Watts 7.1913 (NSW P1086); between Cairns and Herberton, Wild (NSW P1084) and (NSW P1085; BRI); Cook district, Mt. Edith, about 4 miles N of Danbulla, Atherton Tableland, in rainforest, alt. ca. 3,800 ft., a common terrestrial fern with dull green, hairy fronds, Smith & Webb No. 3417, 8.1947 (BRI); Main Creek, near Lake Barrine, alt. about 2,300 ft., along high creek banks in rainforest with *Marattia fraxinea*, Goy No. 451, 7.1938 (BRI); Gadgarra, Atherton Tableland, along a rainforest creek, common, up to ¾ m. high, alt. 800 m., Brass No. 1105, 6.1929 (US 1702272; BRI); Bellenden Ker, in a jungle, Flecker 5.1937 (BRI; CAIRNS 3153); Hypipamee Crater, ½ way between Evelyn and Atherton on the Evelyn Highway, alt. ca. 2,000 ft., in deep basaltic leafmould in rainforest, Messmer 8.1954 (NSW P6946); Babinda Creek, 300 ft. alt., in rich leafmould on steep creek banks in rainforest, Messmer 8.1954 (NSW P6858; BM); Palmerston National Park, in rainforest about 1 mile S of the Highway and 20 miles WSW of Innisfail, alt. ca. 2,100 ft., terrestrial fern 1-1½ ft. high, Smith No. 11261, 9.1960 (BRI; NSW); Tully Falls, Flecker No. 6347, 10.1939 (BRI).

ABSOLUTE SYNONYM: *Dryopteris wurunuran* Domin in Bibl. Bot. LXXXV (1913) 45.

This species, which has only been recorded from north-eastern Queensland, has peculiar, dark brown squamules on the rhizome and bases of the stipes. I have not seen similar squamules in any other species of *Lastreopsis*. The pilose bases of the stipes are also characteristic of *L. wurunuran*.

The specific epithet " *wurunuran* " refers to the aboriginal name of Bellenden Ker.

22. Lastreopsis munita (*Mett.*) *Tindale* in Vict. Nat. LXXIII (1957) 183; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961) 67, pl. VIII.

Habitat terrestrial in subtropical rainforests. *Rhizome* long-creeping, rather narrow, 1·5 to 6 mm. in diam., somewhat sparsely clothed with scales which are black or dark brown, thin, dull or glossy, lanceolate (3: 1) to narrowly ovate (2: 1), 1·5 to 3 mm. long, 0·7 to 1 mm. broad, the cells hexagonal or rectangular, thick-walled with red-brown lumina, the margin entire or with a few, 1- to 5-celled hairs with dark, round, glandular-heads, the apex shortly acuminate or ending in a *Ctenitis*-hair. *Stipes* scattered along the rhizome, 10 to 50 cm. long, 0·5 to 3 mm. broad near the middle, not winged, dull, slightly to very scabrous, the broad apical channel on the upper surface densely tomentose with acute or minutely glandular-tipped, light brown, 2- to 5-celled *Ctenitis*-hairs, the lower surface light brown, pale yellow or light yellow-brown, often red-brown at the base which is clothed with brown or dark brown, shortly acuminate, dull, thin, entire or slightly fimbriate, narrowly lanceolate to narrowly ovate scales which are 2 to 4·5 mm. long and 0·5 to 1 mm. broad. *Main rhachis* winged near the apex and rarely partly winged in the middle by the decurrent bases of the pinnae as well as sometimes by displaced pinnules, the lower surface stramineous, greenish-yellow, whitish-fawn or rarely light brown, smooth or slightly scabrous, on the upper surface the deep channel and raised median portion densely tomentose with hairs similar to those on the stipe; gemmiferous bulbils absent. *Fronds* including the stipes 17 to 85 cm. long. *Lamina* 10 to 50 cm. long, 5 to 45 cm. broad, 2-pinnate to 3-pinnate or rarely 3-pinnate-pinnatifid at the base, markedly catadromous except rarely near the apex, yellowish-green, very thinly coriaceous, quinquangular (2: 1 to 6: 6), glossy above, the apex acuminate. *Primary pinnae* with the lower petiolules unwinged, closely spaced to distant, erecto-patent, 3 to 25 cm. long, 2 to 20 cm. broad, markedly falcate, obliquely lanceolate (3: 1) to broadly ovate (6: 5), 11- to 18-jugate, the lower pinnae opposite, the upper subopposite or alternate, the apex acuminate, the lowest pair the largest. *Secondary pinnae* sessile except sometimes the lowest pair stalked, catadromous, distant, alternate, erecto-patent, unequal-sided, the acroscopic base often expanded, obliquely narrowly lanceolate-cultrate (6: 1) to lanceolate-narrowly oblong (3: 1) or narrowly oblong-elliptical (3: 1) to broadly oblong-elliptical (3: 2), 7- to 16-jugate, the apex acuminate, acute, truncate or broadly rounded, the secondary basiscopic pinna nearest the main rhachis much enlarged, 2 to 15 cm. long, 0·4 to 5·6 cm. broad, with 5 to 12 lobes or segments. *Ultimate segments* sessile, alternate, closely spaced, erecto-patent, elliptical-oblong, the apex truncate, the margin thickened and very prickly toothed, the bases decurrent on the secondary rhachises. *Veins* free, catadromous except for a few of the upper veins, very prominent especially on the upper surface, reaching into the mucros, the minor veinlets from the midnerve of the ultimate segments simple or once or several times forked, the secondary rhachises, costae and bases of the costules densely clothed above with acute, fawn or light brown *Ctenitis*-hairs usually consisting of 2 or 3 cells with red-brown or dark red articulations, the lower surfaces clothed with fewer, stiffer, acute, obtuse or glandular-tipped *Ctenitis*-like hairs of 2 to 3 cells with reddish articulations; minor veinlets and the lamina clothed on both surfaces with scattered, appressed, obtuse, glandular *Ctenitis*-hairs of 2 to 8 cells with very dark red, prominent articulations. *Sori* exindusiate, superficial, orbicular, in one row on each side of the midrib, half-way between the margin and midrib, large, 0·5 to 2 (mostly 1 to 1·5) mm. in diam., borne on the simple veinlets or in forked veinlets usually on their acroscopic branchlet but sometimes on the bifurcation. *Sporangia* small, the pedicel long and slender, with 1 or 2 stalked, oblong, yellow or orange glands, the annulus composed of 13 to 16 thick-walled cells and 8 to 9 thin-walled cells, with lateral dehiscence. *Spores* bilateral, monolete, globose-ellipsoidal, covered with balloon-like wings, fawn, equat. diam. 26·3 to 33·8 μ × polar diam. 22·5 to 30 μ. *Glandular hairs* oblong, appressed, unicellular, red, orange or yellow, mainly scattered along the lower surface of the costae, costules, minor veinlets and lamina, although they are prevalent on both surfaces of the main rhachis and a few also occur on the lower surface of the secondary rhachises and costae.

DISTRIBUTION: Australia (north-eastern New South Wales to north-eastern Queensland in the rainforests of the coast and dividing range).

LECTOTYPE: New Holland, Sieber Syn. Fil. No. 102, Herb. Lugd. Bat. 908, 338-422 (L), examined. ISOTYPE (P), examined. Mettenius' types at the Botanical Institute of the University of Leipzig are said to have been destroyed in World War II, so that a lectotype was chosen (see Vict. Nat. LXXIII (1957) 183).

SPECIMENS EXAMINED:—*Queensland*: Kin Kin, Francis & White 3.1916 (BRI 522); Yandina, Field Naturalists 3.1891 (BRI 514-5); Blackall Range, White 12.1916 (BRI 516; NSW P4660); ditto, Keys 5.1910 (BRI 513); Conondale National Park, via Maleny, very common in rainforest on bank of creek, Goy No. 201, 8.1937 (BRI 530, 531 and 532); Blacksnake Creek, Little Yabba Forest Reserve, near Conondale, Goy & Smith No. 667, 4.1939 (BRI 535, 536 and 537); Upper Cedar Creek, about 20 miles NW of Brisbane, common on damp bank in rainforest, Goy & Smith No. 64, 12.1937 (BRI 533); Mt. Glorious, along road cutting under *Lantana*, alt. about 2,000 ft., fronds drooping, Goy & Smith No. 498, 6.1938 (BRI 539); Cainbable Range, ca. 10 miles SW of Canungra, alt. ca. 2,000 ft., in rainforest floor on plateau, in association with *Lastreopsis decomposita*, *Adiantum formosum* and *Pellaea falcata* var. *nana*, Smith & Tindale 8.1956 (NSW P7444); Enoggera, White 5.1913 (BRI 517); Kenmore, White 5.1915 (NSW P2031); Brisbane River, Bailey (BRI 511); Toowoomba, Stephenson (NSW P4840); Tambourine Mountain, in rainforest, ca. 2,500 ft. alt., Glynne No. 39, 5.1929 (NSW P2481); Cunningham's Gap, Michael No. 2175, 2.1935 (BRI 528); Cunningham's Gap, ±2,400 ft. alt., common along trail in damp basalt soil, Wilson No. 591, 4.1957 (BRI 7055); Albert River, S of Brisbane, in a narrow belt of rainforest on banks of Albert River, Hubbard No. 3840, 8.1930 (US 2200518); Little Nerang River, White 1.1916 (BRI 519); Upper Mudgeeraba, White 12.1915 (BRI 518); Numinbah Valley, small fern common in the rainforest, fronds rigid, erect, dark shining green above, Everist No. 1091, 4.1935 (BRI 526); Numinbah, near Natural Bridge, very common in rainforest, alt. 900 ft., Goy & Smith No. 545, 10.1938 (BRI 538); Moran's Creek, Lamington National Park, alt. 1,500 ft., common in rainforest at foot of falls, Goy & Smith No. 121, 1.1938 (BRI 840; SING); Lamington National Park, in rainforest near Lightning Falls turn-off, alt. ca. 3,400 ft., Smith No. 10917, 3.1960 (BRI 25759).

New South Wales: Macpherson Ranges, via Murwillumbah, Betche 3.1896 (NSW P4449); Mt. Warning, Forsyth 10.1910 (NSW P4446); Tintenbar, Bäuerlen 3.1893 (NSW P4444); ditto, Watts 1901 (NSW P1573); Eureka, Richmond River, Rupp 8.1915 (NSW P4448); Wickham's, near Ballina, Watts 6.1902 (NSW P1571); Marshall's Falls, Alstonville, scrub, shady and humid places, Carron (NSW P4456); Upper Clarence River, Cambage No. 2867, 9.1911 (NSW P4453); Clarence River, Woolls (NSW P4458); Drake, Boorman 10.1901 (NSW P4455); Copmanhurst, Rupp 5.1909 (NSW P4447); Ramornie to Orara River, Blakely & Shiress 7.1922 (NSW P4454); Tower Hill Creek, Dalmorton, 700 ft. alt., plentiful in rocky gully, Constable 10.1952 (NSW P6490; BM; U; P; BO; UC; MO; US; K); Bulgong Heights, Watts 5.1916 (NSW P4452 and P1575); The Springs, Bulga Cutting, between Manning and Hasting Rivers, Watts 4.1915 (NSW P4445); gully near Bulga Cutting, Watts 4.1915 (NSW P4450); The Bulga, N of the Manning River, Watts 4.1915 (NSW P4451); Wallace's Springs (or higher gully), Bulga Cutting, Manning River, Watts 4.1915 (NSW P1572); Nabiac, Gilbert 7.1947 (NSW P5384); Dyer's Crossing, near Taree, Gilbert 9.1947 (NSW P229; SING; BM; MO); ditto, in rainforest, Gilbert 5.1948 (NSW P5331; L; UC; BO; BM; K; US) and 7.1946 (NSW P553).

ABSOLUTE SYNONYMS: *Polypodium munitum* Kaulf. ex Presl, Tent. Pterid. (1836) 180, nom. nud. In the British Museum of Natural History I examined a fragment of *P. munitum* from Kaulfuss' own herbarium labelled " Hunter River, Sieber ex. Herb. Dr. Römer ". *Phegopteris munita* Mett., Pheg. und Asp. (1858) 14, no. 18.

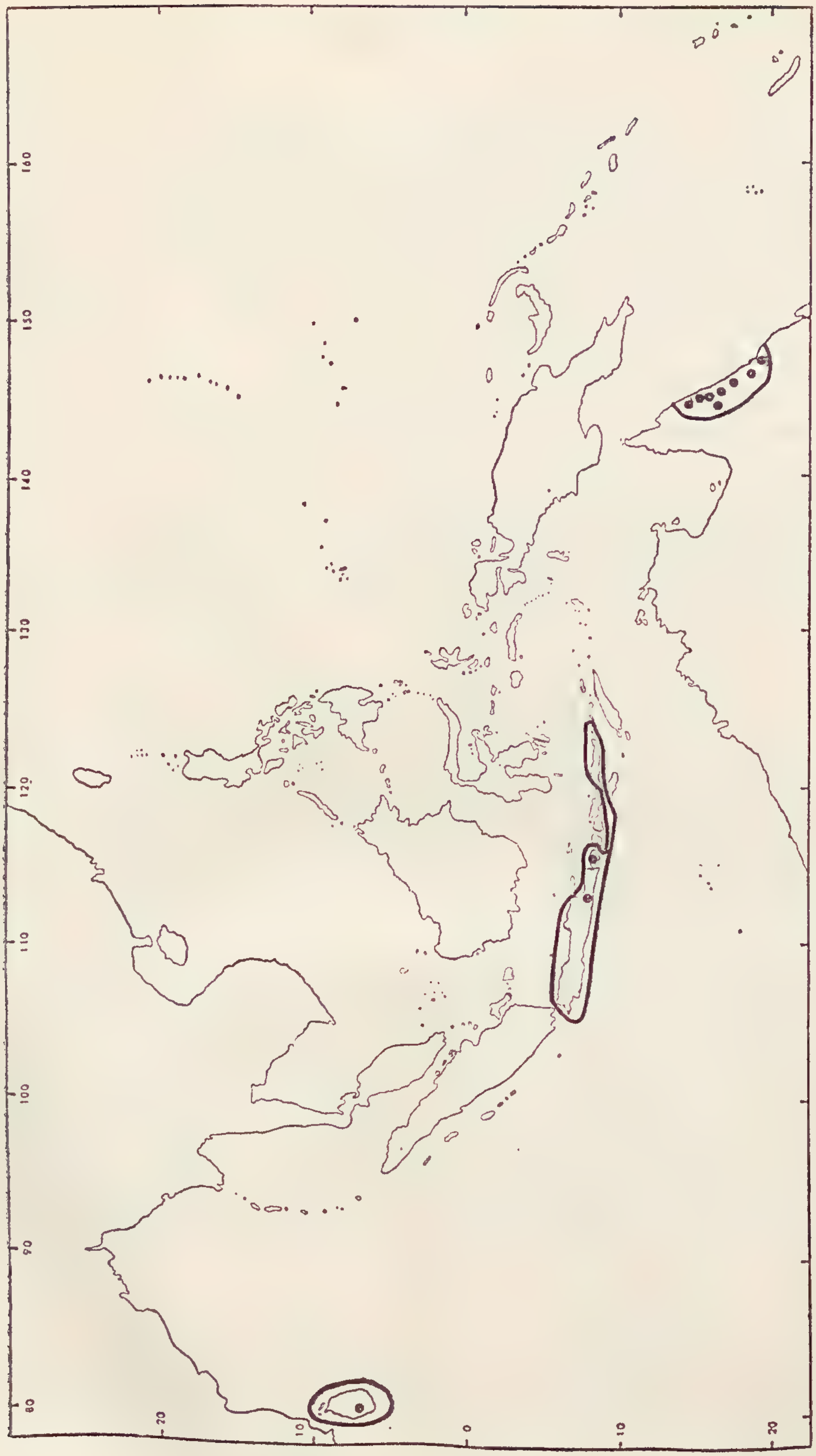
EQUIVALENT SYNONYMS: *Polypodium aspidioides* F. M. Bail. in Proc. Linn. Soc. N.S.W. V (1880) 32, SYNTYPES: Brisbane scrubs, F. M. Bailey (NSW P4461); Brisbane River, F. M. Bailey (BRI 511). In Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961) 69, I chose BRI 511 as the LECTOTYPE. *Dryopteris queenslandica* Domin in Bibl. Bot. LXXXV (1913) 44, 43, f. 7; Melvaine in Proc. Linn. Soc. N.S.W. LXI (1936) 117, SYNTYPES: Tambourine Mountains, Domin No. 77, 3.1910 (examined); Beech Mountains, Domin 1910 (examined); Caboolture scrub, J. Shirley 9.1888 (examined). *Dryopteris baileyi* Maiden et Betche, Census N.S.W. Pl. (1916) 2, based on *Polypodium aspidioides* F. M. Bail. There was already a *Dryopteris aspidioides* (Willd.) C. Chr., native to tropical South America, so that Maiden & Betche chose a new name for the Australian species.

The chief characteristics of *Lastreopsis munita* are the very glossy upper surface of the lamina, the upcurved primary pinnae, the pale-coloured primary rhachises, the narrow long-creeping rhizome, the very sharp marginal teeth and thickened margin of the lamina. It is very closely related to *L. rufescens*, the principal difference being that the long, prickly marginal teeth of the lamina occur from the apices almost to the bases of the secondary pinnae in *L. munita* but are confined to the apices in *L. rufescens*, where these teeth are never as sharp as in the former species and are often reduced to a few crenulations. The secondary pinnae are more widely spaced in the fronds of *L. rufescens*, also, except in a few cases, the main rhachises are light brown instead of pale stramineous or greenish-yellow as in the other species. The upper surface of the lamina is very glossy in *L. munita*, whereas it is dull to glossy in *L. rufescens*, also the texture of the lamina in the latter species is more variable ranging from herbaceous to thickly coriaceous instead of thinly coriaceous as in *L. munita*. Both species are rainforest plants but *L. rufescens* has a much wider distribution which ranges from tropical north-eastern Queensland to New Caledonia, Java, the Lesser Sunda Islands and Ceylon (see map 2), whereas *L. munita* is confined to Australia, where it is fairly common on the North Coast of New South Wales and in Queensland, usually being found in mountain gullies between 2,000 and 3,400 ft. alt. along the banks of streams, near waterfalls or on hillsides away from the creeks. Occasionally *L. munita* is found on limestone hillsides e.g. NSW P7944 collected by Constable at Carrai Carrai State Forest, 30 miles W of Kempsey, N.S.W., in June 1958.

A chromosome count of $n = 41$ was made by Prof. I. Manton (personal communication) on material originally collected by R. Melville No. Q 9 at Intake Creek, North Queensland in 1953. A specimen (NSW P8554) was obtained in August 1962 from this plant which was growing in a fern house at the Royal Botanic Gardens, Kew, England. Intake Creek is the most northerly record for *L. munita*.

23. Lastreopsis rufescens (Bl.) Ching in Bull. Fan Mem. Inst. Biol., Bot. ser., VIII (1938) 160; Tindale in Vict. Nat. LXXIII (1957) 184.

Habitat terrestrial in tropical rainforests, often on hillsides in basaltic soil. *Rhizome* long-creeping, 0·5 to 1·5 cm. broad, covered with the persistent, broken bases of the stipes, clothed towards the apex with scales which are black or dark brown, acute to acuminate, thick, lanceolate (3: 1), about 1 mm. long and 0·3 mm. broad, the cells roundish or hexagonal, thick-walled with red-brown lumina, the margin sometimes fawn and friable, but always markedly fimbriate with glandular-headed hairs. *Stipes* crowded at intervals of 1 to 5 mm. on the rhizome, 8 to 45 cm. long, 0·2 mm. broad at the middle, not winged, dull or slightly glossy, smooth or very slightly scabrous, light brown or pinkish-fawn, light fawnish-mauve or rarely pale stramineous, always dark brown at the base; channel on the adaxial surface clothed with either short, acute *Ctenitis*-hairs (3 to 4 cells long and with red articulations) or with obtuse or minutely glandular-tipped, red-brown or opaque *Ctenitis*-hairs (5 to 9 cells long and with red articulations); lower surface glabrous in the upper and middle regions but clothed towards the base with a few of the same type of scales as on the rhizome. *Main rhachis* not winged at the base and middle but broadly winged towards the apex which is produced into a long, caudate, lobed portion; adnate displaced pinnules not present; the lower surface smooth or very slightly scabrous, light brown or pinkish-fawn, rarely pale stramineous or light fawnish-mauve, clothed in the channel and raised median band on the upper surface with the same type of hairs as on the stipe, the lower surface sometimes glabrescent, otherwise bearing short, acute or obtuse, stiff, spreading, opaque or brown hairs (2 to 3 cells long and with red-brown articulations), together with a few, obtuse, appressed *Ctenitis*-hairs. *Fronds* 33 to 85 cm. long including the stipes. *Lamina* 10 to 30 cm. long, 10 to 23 cm. broad, 2-pinnate-pinnatifid to 4-pinnate, mostly catadromous below and anadromous towards the apex, sometimes catadromous throughout, dull or glossy, dark green above, slightly to much paler on the lower surface, herbaceous to thickly coriaceous, clothed between the veins with a few, appressed *Ctenitis*-hairs, the apex caudate, the margin markedly thickened. *Primary pinnae* with wingless petiolules 2 to 12 mm. long in the lower 3 or 4 pairs, the upper pairs sessile or with winged petiolules, obliquely narrowly ovate (2: 1) to obliquely ovate (3: 2), 7- to 10-jugate, the apex caudate; basal pair 8 to 18·5 cm. long, 3·5 to 11·5 cm. broad, markedly basiscopically produced. *Secondary pinnae* with petiolules 1 to 4 mm. long in the lower 2 or 3 segments of the basal primary pinnae, otherwise sessile or subsessile, well-spaced, 7- to 12-jugate, the lowest pair mostly obliquely narrowly lanceolate (6: 1) to lanceolate (3: 1), 1·8 to 8 cm. long, 1·2 to 4·2 cm. broad, with a subacute apex, the other pairs obliquely narrowly oblong (3: 1) to oblong (2: 1), 1·2 to 3·3 cm. long, 0·5 to 1·1 cm. broad, the apex broadly rounded. *Tertiary pinnae* sessile except the basiscopic pinnule of the lowest pair of secondary pinnae, 0·8 to 3·5 cm. long, 0·3 to 1·3 cm. broad, some of the lower segments obliquely lanceolate (3: 1) to narrowly ovate (2: 1), the upper pairs narrowly oblong (3: 1) to oblong (2: 1); apex broadly rounded, with aristate teeth or a few crenulations. *Veins* free, rather prominent on the lower surface, pinnate in the segments, a number of the minor veinlets not reaching the margin, clothed on the lower surface of the secondary rhachises, costae, costules and minor veinlets with stiff, acute or glandular-headed hairs which are 2 or 3 cells long and with red articulations, as well as appressed *Ctenitis*-hairs, clothed on the upper surface of the secondary rhachises and costae with hairs similar to those on the channel of the stipe, but the costules and minor veinlets glabrous above. *Sori* exindusiate, orbicular, medial on the minor veinlets or their acroscopic branchlets, half-way between the margin and midrib or otherwise submarginal. *Sporangia* small and flattened, the pedicel long and narrow, with 1 or 2 stalked, oblong, yellow or orange, glandular hairs; annulus composed of 12 to 14 thick-walled cells and 7 to 8 thin-walled cells,



Map 2. Distribution of *Lastreopsis rufescens.*

the dehiscence lateral. *Spores* bilateral, globoso-ellipsoidal, with a few crests on the perispore, equat. diam. 24·13 to 41·25 μ × polar diam. 22·5 to 30 μ, the wing very dissected into lobes, 5·63 to 9·38 μ in diam. *Glandular hairs* oblong, unicellular, appressed, yellow or orange, freely scattered along the lower surface but scarce on the upper surface of the rhachises, costae, costules, minor veinlets and the lamina.

Distribution: Australia (eastern Queensland), Java, Bali, Flores, Ceylon and New Caledonia.

Holotype: Java, Blume (L 908, 338 . . . 446, left hand specimen), examined. This specimen agrees very well with the upper part of plate 91 in Blume, Fl. Jav. II (1829) 194.

Specimens Examined:—*Australia, Queensland:* Railway cutting, Cairns to Kuranda, Watts 7.1913 (NSW P450); Railway cutting between Redlynch and Stoney Creek, Watts 7-8.1913 (NSW P146, P66 and P68); Trinity Bay Ranges, on the hills, Bailey 10.1879 (MEL); Trinity Bay, Bailey (BRI); Emerald Creek, about 5 miles N of Danbulla, a small terrestrial fern on the rainforest floor, Smith No. 3773, 8.1948 (BRI 1029); Babinda Creek, 300 ft. alt., in rainforest, in deep leafmould, on steep hillside, Messmer 8.1954 (NSW P6857); Kairi (N of Yungaburra), White 1.1918 (BRI); Yungaburra, White 1.1918 (BRI); Lake Barrine, in rainforest, Messmer 8.1952 (NSW P7509); Allumbah, Herberton, Waller 10.1909 (NSW P4843); Allumbah/Yungaburra, Domin No. 79, 1910 (PR 523329); Hypipamee Crater, half way between Evelyn and Atherton on the Atherton Highway, in heavy rainforest, basaltic soil, Messmer 8.1954 (NSW P7222); Tully Falls, Messmer 1952 (NSW P2761); Rockingham Bay, Beddome (BRI); Paluma Range, in rainforest, Kennedy 9.1957 (NSW P7695); Sea View Range, Dallachy 7.1864 (MEL).

Ceylon: without specific locality, Ferguson No. 158 (US 816757; NSW P7793); without specific locality (L 908,338 . . . 418); without specific locality, ex Herb. Peradenya, G. Wall. (BO 102293).

Java: Seloroma, Tengger, 1,500 m. alt., Mousset 7.1909 (NSW P7794; US); Tengger montes, pr. Kempong Seloroma in coffetis, 1,500 m., Mousset 1909, Rosenstock Filices Javae orientalis 82 (L 910, 211 . . . 796).

Bali: Secondary forest N of Kintamani, Holstvoogd No. 871, 4.1950 (L; NSW).

Flores: Lesser Sunda Islands, Inie Lika, W. helling, in primary forest, ca. 1,500 m. alt., Posthumus No. 3129, 11.1932 (BO 102287); O. helling, G. Mandaswae, ±1,350 m. alt., in primary forest, Posthumus No. 3310, 11.1932 (BO 102288-9); Lombok, . . . Pussuk, in primary forest, 1,200 m. alt., Rensch No. 373, 12.1928 (BO 102292).

Absolute Synonyms: *Aspidium rufescens* Bl., Enum. (1828) 168; *Polypodium rufescens* (Bl.) Bl., Fl. Jav. II (1829) 194, t. 91 (good illustration); Beddome, Ferns Southern India (1864) t. 236; *Phegopteris rufescens* (Bl.) Mett. in Ann. Lugd. Bat. I (1864) 223; v.A.v.R., Malayan Ferns (1908) 493; *Nephrodium rufescens* (Bl.) Diels, Naturpfl. I, 4 (1899) 175; *Dryopteris rufescens* (Bl.) C. Chr., Ind. Fil. (1905) 290; Backer and Posthumus, Varenfl. voor Java (1939) 48, f. 8.

Equivalent Synonyms: *Polypodium aspidioides* F. M. Bail. var. *tropica* F. M. Bail. in Proc. Linn. Soc. N.S.W. V (1880) 32, Holotype: Ranges, Trinity Bay, Queensland, F. M. Bailey (BRI), examined; Isotype (MEL); *Dryopteris tropica* (F. M. Bail.) Domin in Bibl. Bot. LXXXV (1913) 44.

The specimens from Australia and Ceylon are 2-pinnate-pinnatifid or 3-pinnate but those from Java and the Lesser Sunda Islands are usually 3-pinnate-pinnatifid, although 3-pinnate fronds sometimes occur. The Australian material has been previously known as *Dryopteris tropica* but there does not appear to be any evidence for maintaining this as a distinct species, merely because the fronds are usually less divided than in specimens from Java, especially as 3-pinnate fronds do occur in material from the latter country.

The holotype of *Lastreopsis rufescens* (L 908,338 . . . 446, left hand specimen) which was collected in Java by Blume, has much more bluntly toothed ultimate segments of the lamina than in any other specimen of this species which I have examined. Unfortunately the rhizome is not present in the holotype. The illustration of *L. rufescens* in Blume's Flora Javae, II (1829) t. 91, matches the type specimen very well, although the lowest pair of primary pinnae is missing in the latter. Most of the specimens of this species collected in Java and the Lesser Sunda

Islands have rather sharply toothed ultimate segments of the lamina except a specimen collected at Seloroma by Mousset (NSW P7794), in which the teeth are slightly blunter. There is a good deal of variation in the Australian material, as some specimens have aristate margins e.g. NSW P66, P2761 and P7695, whereas in others the margin is crenate, e.g. NSW P6857 and L. S. Smith No. 3773. There is no correlation between the type of margin of the pinnae and the length of the hairs in the channel on the upper surface of the main rhachis. In most specimens from Java, Ceylon and Australia these hairs are 2 to 4 cells long but in two collections from Queensland they are composed of 6 to 9 cells.

A chromosome count of $2n = 82$ was obtained on cultivated material of *Lastreopsis rufescens* originally obtained by P.R. Messmer at Topaz Road, Atherton Tableland, NE Queensland, in rainforest. The voucher specimen is labelled " Neutral Bay, N.S.W., cultivated, M. Tindale 1.1964 (NSW P8578) ". This chromosome count is published with the kind permission of Dr. Briggs.

24. Lastreopsis subsericea (*Mett.*) *Tindale* in Vict. Nat. LXXIII (1957) 183.

Habitat terrestrial in tropical rainforests on the mountain slopes or in ravines. *Rhizome* long-creeping, 2·5 to 7 mm. in diam., densely clothed with scales which are spreading, persistent, bright dark brown, entire or rarely with a few denticulations, acuminate to caudate, becoming thick especially at the base, very narrowly lanceolate (more than 6: 1) to linear (12: 1), 5 to 6 mm. long, 0·5 to 0·6 mm. broad, the cells hexagonal or more or less oblong, with red-brown or golden-brown lumina. *Stipes* at intervals of 1 to 3 cm. apart on the rhizome, 15 to 48 cm. long, 1 to 2·5 mm. broad at the middle, scabrous due to small prominences remaining at the base of abraded hairs, glossy, stramineous on the upper surface, light to medium brown on the lower surface, dark brown at the base, clothed near the base with smaller scales similar to those on the rhizome, densely and stiffly pilose throughout their length with hairs which are soft, spreading, stramineous, or silvery, 1·5 to 3 mm. long, composed of 6 to 8 cells. *Main rhachis* wingless except near the apex where there is a very narrow wing about 0·1 mm. broad on each side, adnate displaced pinnules sometimes present, scabrous, rarely almost smooth, stramineous above and fawn or brown below, usually glossy, rarely dull, furrowed above, the channel and raised median band densely clothed with long, fine, septate, simple hairs 6 to 12 cells long as well as smaller, narrower, 3- to 5-celled hairs, the lower surface glabrescent or with a few, broken bases of hairs up to 6 cells long, a few, 3- to 4-celled, glandular-tipped hairs and an occasional *Ctenitis*-hair; gemmiferous bulbils absent. *Fronds* 32 to 82 cm. long including the stipes. *Lamina* 18 to 35 cm. long, 11·5 to 27 cm. broad, 4- to almost 5-pinnate at the base, young specimens sometimes 3-pinnate, catadromous almost throughout, quinquangular, submembranous or herbaceous, flaccid, dark green above, much paler on the lower surface; apex acute or subacuminate; margin markedly thickened. *Primary pinnae* stalked except the sessile or subsessile apical pairs, the petiolules of the lowest pair 8 to 15 mm. long, obliquely narrowly ovate (2: 1) to obliquely ovate (3: 2), the apex acuminate; basal pair each 10·5 to 20 cm. long, 6·5 to 11·5 cm. broad, markedly basiscopically produced. *Secondary pinnae* shortly stalked, the petiolules not winged in the lower pairs, winged in the upper, closely spaced, obliquely lanceolate (3: 1) to obliquely narrowly ovate (2: 1), 2 to 11·5 cm. long, 0·8 to 5·5 cm. broad; apex acute to subacute. *Tertiary pinnules* winged except in rare cases, closely spaced, 1·5 to 3·2 cm. long, 0·4 to 1·7 cm. broad, obliquely lanceolate (3: 1) to obliquely ovate (3: 2), the apex acute to obtuse. *Quaternary pinnules* of mature fronds deeply dissected into long, digitate, obtuse lobes. *Secondary rhachises* clothed above as on the main rhachis, the lower surface bearing very fine, septate hairs 4 to 9 cells long, as well as small, hammer-headed, glandular hairs 3 to 4 cells long and an occasional, appressed *Ctenitis*-hair. *Veins* fairly prominent, free, the minor veinlets not reaching the margin, pinnate, forked or simple in the ultimate segments; costae, costules and minor veinlets clothed with a number of appressed *Ctenitis*-hairs on both surfaces amongst the long, needle-like hairs; numerous, small, very fine hairs 3 or 4 cells long occurring principally near the junctions of the secondary pinnae with the secondary rhachis and the junctions of the primary pinnae with the main rhachis. *Sori* indusiate, orbicular, marginal or almost so, borne at the apex of mostly simple minor veinlets or on their acroscopic branchlets. *Indusium* 0·5 to 0·8 mm. in diam., reniform, brown, often dark brown towards the centre, persistent, glabrous or clothed with 1 or 2 needle-like hairs; margin entire or slightly undulate. *Sporangia* small, with a long, slender pedicel bearing 1 or 2 stalked hairs each with a yellow, oblong, glandular head; annulus composed of 12 to 16 thick-walled cells and about 8 thin-walled cells; dehiscence lateral. *Paraphyses* consisting of abortive sporangia bearing 1 or 2 long-stalked hairs each with a yellow, oblong, glandular terminal cell. *Spores* bilateral, monolete, globose-ellipsoidal, black, echinate, equat. diam. 24·38 to 37·5 μ × polar diam. 18·75 to 28·13 μ, the numerous spines straight or slightly hooked or curved, 1·88 to 3·75 μ long. *Glandular hairs* shortly stalked, oblong, unicellular, yellow, scattered along both surfaces of the costae, costules, minor veinlets and the surface of the lamina, but very few on the main and secondary rhachises and none around the periphery of the indusium. (Plate XV, f. 4; Plate XI, f. 1-2).

DISTRIBUTION: New Caledonia.

HOLOTYPE: Balade, New Caledonia, Vieillard No. 1612 (P). This type was examined on my behalf by courtesy of Mme. Tardieu-Blot and was compared with a fragment sent from the National Herbarium of New South Wales, Sydney.

SPECIMENS EXAMINED:—*New Caledonia:* Forested slope of Mt. Koghi, above l'Hermitage, terrestrial fern, 500-800 m. alt., McKee No. 3935, 2.1956 (NSW P7790); road to l'Hermitage, Nouméa district, 400 m. alt., in rainforest, McKee No. 2136B, 2.1955 (NSW P7788; US; UC; SING) and McKee No. 2132 (NSW P7789; BM); Houailou River, 500 m. alt., in rainforest, Godfrey No. 30, 9.1953 (NSW P6596); in sylvis humidis montium, Vieillard No. 1613 (NSW P7791); Mt. Koghi, 300 m. alt., in silvis ad rupes, I. Franc 7.1912 (Rosenstock Fil. Nov. Cal. No. 131), (L 913, 153 . . . 412); ravin au pied du Moclaoui, 300 m. alt., M.G. Franc 11.1912 (US 566531); ditto, Franc No. 1475, 12.1912 (BRI 510).

ABSOLUTE SYNONYMS: *Aspidium subsericeum* Mett. in Ann. Sc. Nat., sér. 4, XV (1861) 74; *Ctenitis subsericea* (Mett.) Copel., Gen. Fil. (1947) 125.

The ultimate segments of the fronds in *L. subsericea* are narrower than in most species of *Lastreopsis*, giving a very finely divided appearance to the lamina. It is the only species of the genus with echinate spores but in other ways it is a typical member of the *L. decomposita* group with oblong, yellow, glandular hairs on the fronds, non-clathrate scales of the rhizome and a thickened leaf-edge which is decurrent along the costae. The indusia are reniform instead of reniform-orbicular as in the other members of this group. The marginal sori of *L. subsericea* are reminiscent of *L. nephrodioides* (Bak.) Tindale, of Lord Howe Island, although the sori of the latter are often borne on short prominences.

L. subsericea has a superficial resemblance to *L. wurunuran*, of Queensland, since the stipe of the latter has a very similar vestiture of soft, fawn or stramineous, septate, simple hairs which are 4 to 12 cells long, although they are confined to the lower portion of the stipe, unlike *L. subsericea* where they occur throughout the length of the stipe. However in *L. subsericea* dark brown, very narrowly lanceolate to linear scales 5 to 6 mm. long occur towards the base of the stipes amongst the long hairs, whereas in the other species dark brown, orbicular to very broadly ovate squamules are present. Both species have pilose fronds, light brown lower surfaces of the stipes and 2 stramineous ridges on the upper surface of the main rhachises. In *L. wurunuran* the sori are medial to submarginal instead of marginal or almost so as in *L. subsericea*, also the spores are covered with balloon-like protuberances instead of echinate as in the latter species.

25. Lastreopsis marginans (*F. Muell.*) *D. A. Smith et Tindale* in Vict. Nat. LXXIII (1957) 182; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 69, pl. IX, f. 5.

Habitat terrestrial on slopes in subtropical rainforests or in *Tristania conferta* wet sclerophyll forests, usually not near creeks. *Rhizome* thick, shortly creeping, 3 to 7 mm. broad, sparsely clothed with scales which are dark brown, acute or acuminate, entire or slightly denticulate, thin, linear (more than 12: 1) to lanceolate (3: 1), 1·5 to 4 mm. long, 0·3 to 0·6 mm. broad, the cells thick-walled, hexagonal or rectangular, with yellow or red-brown lumina. *Stipes* at intervals of 0·2 to 1 cm. on the rhizome, 15 to 50 cm. in length, 1 to 3 mm. broad near the middle, pinkish-fawn, light red-brown, light brown or dark grey-brown, dull, not winged, smooth near the apex but often very scabrous near the base, with 2 prominent ridges on the upper surface, sparsely pubescent with substrigose hairs in the channel, densely clothed near the base and middle of the stipes with dark brown scales of the same type as on the rhizome. *Main rhachis* winged towards the apex with the decurrent bases of the primary pinnae and displaced pinnules, smooth or slightly scabrous, dull, shallowly furrowed on the upper surface, the channel and median raised band densely tomentose with substrigose hairs which are acute, brown or light red-brown, rather appressed, the lower surface fairly densely pubescent with finer, spreading hairs with red articulations; main rhachis also bearing a few, scattered scales which are dark brown, linear to ovate, acuminate or ending in a *Ctenitis*-hair, entire or with a few, marginal glands or fimbriae; gemmiferous bulbils absent. *Secondary rhachises* clothed similarly to the main rhachis. *Fronds* 40 to 115 cm. long including the stipes. *Lamina* 22 to 70 cm. long, 20 to 60 cm. broad, 3- to 4-pinnate, markedly catadromous, coriaceous, dark green, quinquangular (6: 6 to 3: 2), glabrous between the minor veinlets, the apex acuminate, the upper surface very glossy but the lower dull and paler. *Primary pinnae* with wingless petiolules about 0·3 to 3 cm. long in the lower and middle pairs, the upper pairs sessile with a basal pinnule often decurrent on the main rhachis, distant or closely spaced, erecto-patent, 12·5 to 38 cm. long, 8 to 20 cm. broad, often falcate, obliquely narrowly ovate (2: 1) to ovate (3: 2), 13- to 18-jugate, the apex acuminate. *Secondary pinnae* with the lowest pair usually very shortly stalked, the others sessile, the lower pairs narrowly lanceolate-rhomboidal (6: 1) to lanceolate-rhomboidal (3: 1), the upper narrowly oblong-rhomboidal (3: 1) to oblong-rhomboidal (2: 1), 14- to 20-jugate, the apex sharply acute and mucronulate, the basiscopic pinna of the lowest pair of primary pinnae much enlarged, sometimes twice as long as the pinna immediately above it, 7 to 16 cm. long and 1·5 to 4 cm. broad. *Tertiary segments* sessile, closely spaced, obliquely ovate-deltoid, often dilated towards the middle, the apex sharply acute and mucronulate, the margin thickened, entire or dentate, the base decurrent along the secondary rhachis in the basiscopic segment. *Veins* free, markedly catadromous, rather prominent on the upper surface, obscure below, the minor veinlets from the midrib of the ultimate segments simple, pinnate or forked; costae tomentose above with pinkish-fawn or light red-brown *Ctenitis*-hairs and below with finer, more spreading hairs with red articulations, the costules very sparsely clothed, the minor veinlets glabrous or almost so. *Sori* indusiate, forming an almost marginal line around the ultimate segments, orbicular, crowded, nearly terminal on the minor veinlets or their acroscopic branches, usually 4 to 10 on each segment, pustulate on the adaxial surface. *Indusium* 0·3 to 0·7 (usually 0·3 to 0·4) mm. in diam., peltate to orbicular-reniform, fawn in the young condition, very dark brown or black in the later stages, persistent, membranous when young, much firmer in the old condition, glabrous, the margin sinuate or entire. *Sporangia* small, flattened; annulus composed of about 13 to 16 thick-walled cells and 8 to 9 thin-walled cells, with lateral dehiscence; pedicel long and slender, sometimes with a red or red-brown, marginal gland. *Spores* bilateral, monolete, globose-ellipsoidal, light to dark brown, the perispore covered with rounded protuberances, equat. diam. 33·8 to 37·5 μ × polar diam. 21 to 32 μ. *Glandular hairs* rounded or oblong, dark red or dark red-brown, scattered along the rhachises, costae, costules, minor veinlets, the surface of the fronds and on the indusia especially around the periphery. (Plate IX, f. 5).

DISTRIBUTION: Australia (south-eastern Queensland, the North Coast and northern coastal ranges of New South Wales).

LECTOTYPE: Clarence River, Beckler (MEL), see Tindale in Vict. Nat. LXXIII (1957) 182. At the National Herbarium, Melbourne, there are three SYNTYPES of *Aspidium decompositum* (R. Br.) Spreng. var. *marginans* F. Muell., namely Clarence River, Beckler; Richmond River, C. Moore and Moreton Bay, F. Mueller. Unfortunately none of them is complete with a rhizome but the specimen collected by Beckler at the Clarence River is the best specimen.

SPECIMENS EXAMINED:—*Australia: Queensland:* Kin Kin, White 1.1917 (BRI); ditto, Francis & White 3.1916 (BRI); Wide Bay district, Noosa, fairly common in a small patch of light rainforest bordering a gully, Goy & Smith 7.1943 (BRI); Yandina, Simmonds 3.1891 (SING; BO 102277); Blacksnake Creek, Little Yabba Forest Reserve, near Conondale, very common in rainforest, fronds up to 3 ft. long, dark glossy green, rhizome stout, shortly creeping, Goy & Smith No. 682, 4.1939 (BRI); Conondale National Park, via Maleny, very common in rainforest on creek bank, fronds very glossy, dark green, Goy No. 204, 8.1937 (BRI); Eudlo, Simmonds 1895 (BRI); Woodford, Wise No. 3, ex Herb. Longman, presented 9.1931 (K); Cedar Creek, D'Aguilar Range, NW of Brisbane, alt. 300 ft., terrestrial in rainforest . . . deeply rooted in the alluvial soil, growing under dense shade of tree vines and young, broad-leaved, stinging trees (*Laportea gigas*), growing in very damp leaf mould . . . Jackson No. 23, 1.1932 (K); Moreton district, Upper Cedar Creek, near Mt. Glorious, fronds dark glossy green, Smith 1940 (BRI); Upper Cedar Creek, about 20 miles NW of Brisbane, fronds 2-3 ft. high, common in rainforest, the upper surface of the fronds dark green, shining, Goy & Smith No. 50, 12.1937 (BRI); Mt. Glorious, alt. about 2,400 ft., commonest fern in rainforest, Goy & Smith No. 501, 6.1938 (BRI); 1 mile NW of Mt. Glorious, alt. 1,800 ft., in *Tristania conferta* forest, with *Doodia aspera*, *Hypolepis punctata* and *Blechnum cartilagineum*, Smith & Tindale 5.1961 (NSW P8229); Toowoomba, Stephenson (NSW P4443); Tambourine Mountain, Shirley 12.1915 (NSW P5111); Tambourine, 2,000 ft. alt., Meebold No. 7745 Fl. of Queensland, 1.1930 (K); Mt. Tambourine, alt. ca. 2,500 ft., in evergreen forest, Glynne No. 45, 5.1929 (NSW P6978); Numinbah Valley, large fern in rainforest, fronds 3 to 4 ft. high, dark glossy green, alt. 900 ft., Goy & Smith No. 532, 10.1938 (BRI); Rathdowney, Boorman 8.1916 (NSW P4441); Moran's Creek, Lamington National Park, alt. 2,000 ft., in scrub on creek bank, above the falls, Goy & Smith No. 126, 1.1938 (BRI; BM); Roberts Plateau, Lamington National Park, alt. 3,000 ft., in rainforest near the summit, Smith & Tindale 8.1956 (NSW P7431); Springbrook, McPherson Range, White 1.1916 (BRI).

New South Wales: Tweed River, Deane 1895 (NSW P4435); Cudgen, Tweed River, Moore 1896 (NSW P4434); Tweed, Guilfoyle 1871 (MEL); Mt. Warning, Fraser 5.1930 (SYD); Cooper's Creek, near Mullimbimby, very common fern near rotting tree trunks in rainforest, Goy No. 132, 8.1936 (BRI; BM); Wiangarie State Forest (ca. NE of Kyogle), common on basalt ridges, Constable 1.1953 (NSW P7231; BM; US; K; MO; UC; P; U; GH; BO; MEL; L); Richmond River, Helms (NSW P4430); ditto, Watts (NSW P4437); ditto, Hodgkinson 1874 (MEL; K;) ditto, Henderson (K; MEL); Dunoon, Fletcher 4.1890 (NSW P4432); Tintenbar, Bäuerlen No. 639, 11.1891 (NSW P4429); ditto, Watts 1901 (NSW P4439); Clarence River (NSW P4428); Brunswick Heads, Wiburd 8.1938 (NSW P5489); Bellinger Ranges, Fitzgerald (MEL); Macleay River, Fitzgerald (MEL).

ABSOLUTE SYNONYM: *Aspidium decompositum* (R. Br.) Spreng. var. *marginans* F. Muell., Fragm. Phyt. Austr. V (1866) 137.

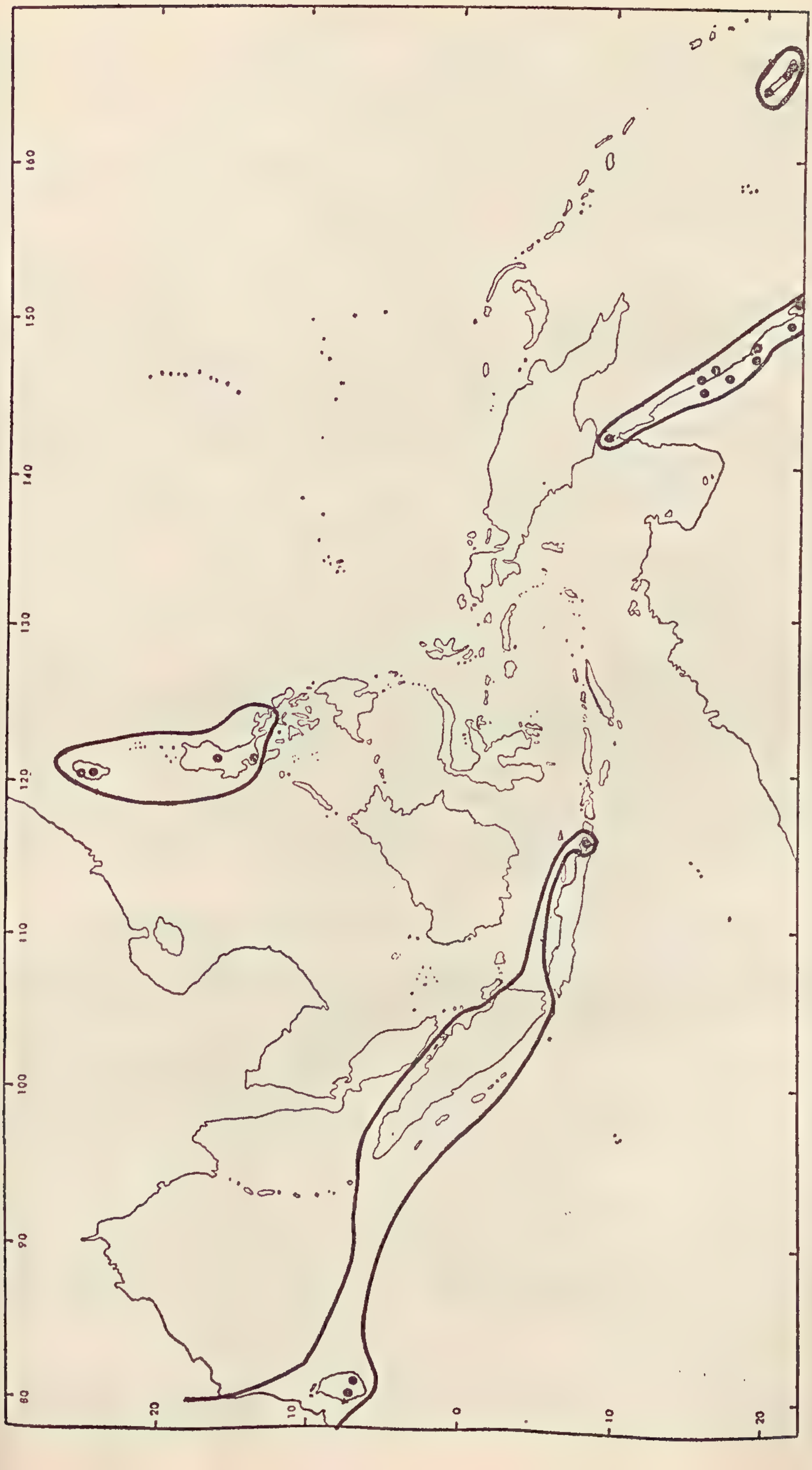
Aspidium tenerum was misidentified by F. M. Bailey in Lith. Ferns Queensl. (1892) t. 139, as this illustration is clearly *L. marginans*. The fern cited as *Dryopteris tenera* by Domin in Bibl. Bot. LXXXV (1913) 38, is really *L. marginans* according to his description.

This is a fairly common fern in the subtropical rainforests and the *Tristania conferta* wet sclerophyll forests of south-eastern Queensland but it extends to the far North Coast and northern coastal ranges of New South Wales. It is more closely allied to *L. tenera* (R. Br.) Tindale which ranges from southern India, Ceylon, Formosa, Bali, Sumatra, Philippines, Fiji, New Caledonia to north-eastern Queensland, than to any other species of this genus. These two species share the following characteristics:— a thick, shortly creeping rhizome, dark brown or black, glabrous, glandular indusia, sori forming an almost marginal line around the ultimate segments and globose-ellipsoidal spores with perispores bearing rounded protuberances. However, these two species may be readily distinguished, since the lamina of *L. marginans* is very dark green, leathery and very glossy above, whereas in *L. tenera* it is a much lighter green, dull on the upper surface, herbaceous and flaccid. In *L. tenera* there are soft, short, white hairs scattered on the lamina between the minor veinlets, whereas in *L. marginans* the lamina is glabrous. The ultimate segments of the frond in *L. marginans* are ovate-deltoid with a tendency to be dilated towards the middle and each has one sharp apical tooth. In *L. tenera* the ultimate segments are oblong, the apices being acute to truncate or with several, rather obtuse or sharp teeth. The fronds of *L. marginans* are usually 4-pinnate (or 3-pinnate when young) but in *L. tenera* they are often 4-pinnate-pinnatifid, although they are occasionally 4-pinnate.

A chromosome count of $2n = 82 \pm 2$ was obtained by B. G. Briggs on cultivated material of *L. marginans* originally obtained by L. S. Smith at Mt. Glorious, SE Queensland. The voucher specimen is labelled " Neutral Bay, N.S.W., cultivated, M. Tindale, 5.1964 " (NSW P8601). This count is being published here with the kind permission of Dr. Briggs.

26. Lastreopsis tenera (*R. Br.*) *Tindale* in Vict. Nat. LXXIII (1957) 181.

Habitat terrestrial in tropical rainforests often near rivers or streams, on coral islands, in marginal rainforests of *Agathis* and *Araucaria*, in forested gullies and in *Eucalyptus-Casuarina* forests on dry hillsides. *Rhizome* thick, creeping, with closely spaced stipes, 1 to 1·3 cm. in diam., densely clothed with scales which are rather persistent, bright dark brown, acuminate to hair-pointed, dull to glossy, thin, narrowly lanceolate (6: 1) to lanceolate (3: 1), 2 to 12 mm. long, 0·3 to 1·5 mm. broad, the cells hexagonal to rectangular, thick-walled, with red-brown or yellow-brown lumina, entire or slightly denticulate and/or with a few, oblong, marginal, glandular hairs. *Stipes* mostly at intervals of 0·5 to 1 cm. apart on the rhizome, 20 to 75 cm. in length, 1 to 3·5 mm. broad near the middle, pinkish-fawn or light brown, dull, not winged, scabrous towards the base, smooth or slightly scabrous towards the middle and apex, with 2 prominent ridges on the adaxial surface, the channel clothed near the apex with acute or glandular-tipped, 2- to 6-celled, fawn or rufous hairs with dark red septa, the lower surface pubescent with similar but finer hairs, densely clothed near the base and sometimes near the middle with scales similar to those on the rhizome. *Main rhachis* winged towards the apex by adnate displaced pinnules, dull, shallowly furrowed on the upper surface, the channel poorly defined except towards the base of the main rhachis, the raised portion and the channel densely clothed with fuscous or rufous, acute or glandular-tipped hairs with dark red articulations, the lower surface clothed with finer hairs and bearing small, dark brown, lanceolate scales; not gemmiferous by scaly buds. *Secondary rhachises* clothed similarly to the main rhachis. *Fronds* 55 to 75 cm. long including the stipes. *Lamina* 25 to 75 cm. long, 20 to 40 (rarely up to 60) cm. broad, 4-pinnate to 4-pinnate-pinnatifid, markedly catadromous, rather light green, usually drying brown, herbaceous, thin, flaccid, the upper surface dull, very slightly darker or the same colour as the lower, quinquangular (3: 2) to (6: 5), the margin and the surface between the veinlets clothed with numerous, short, acute or glandular-tipped, fine, whitish, 2- or 3-celled hairs, the apex of the lamina abruptly acuminate. *Primary pinnae* with wingless, densely pubescent petiolules about 0·5 to 3 cm. long in the lower and middle pairs, the upper pairs sessile with a basal pinnule adnate to the main rhachis, distant or closely spaced, erecto-patent, often falcate, the



Map 3. Distribution of *Lastreopsis tenera*, except Fiji which is not shown on this projection.

lowest pair the largest, being basiscopically produced, 14 to 40 cm. long, 7·5 to 25 cm. broad, obliquely narrowly ovate-deltoid (2: 1) to broadly ovate-deltoid (6: 5), the apex acuminate. *Secondary pinnae* with the lowest pair usually very shortly petiolulate, the others sessile, closely spaced, the lower pairs obliquely narrowly lanceolate (6: 1) to narrowly ovate (2: 1), the upper obliquely narrowly oblong (3: 1) to oblong (2: 1), the apex subacute or acuminate, the basiscopic pinna of the lowest pairs of primary pinnae much enlarged, sometimes twice as long as the pinna immediately above it, usually 9·5 to 17 cm. long and 3 to 9 cm. broad. *Tertiary segments* petiolulate or sessile, narrowly oblong-rhomboidal (3: 1) to oblong-rhomboidal (2: 1), 15 to 30 mm. long and 6 to 10 mm. broad, the apex obtuse, the base decurrent and thickened along the margin. *Ultimate segments* more or less oblong, the apex truncate, obtuse, acute or subacute with a few, obtuse or acute apical teeth in the larger segments, rather asymmetrical, the principal apical tooth acroscopic, the margin thickened. *Veins* free, markedly catadromous, not reaching the margin, not prominent, the minor veinlets from the midrib of the ultimate segments simple, once forked or pinnate, the lower surface of the costae and costules densely clothed and the minor veinlets sparsely clothed with acute or glandular-tipped, fawn or rufous, spreading, 2- to 6-celled hairs and a few, lax, 6- to 10-celled *Ctenitis*-hairs, the hairs on the upper surface coarser, a few, dark brown squamules often scattered along the costules and minor veinlets. *Sori* indusiate, almost marginal, orbicular, 0·3 to 1 mm. in diam., terminal or almost so on the simple minor veinlets or medial or terminal on the acroscopic branchlet of forked veinlets. *Indusium* 0·2 to 0·5 mm. in diam., reniform-orbicular or almost peltate, black or dark brown, but light brown in the early stages, slightly pustulate above, glabrous or with long acicular hairs, persistent or subpersistent, firm in the mature condition, the margin usually crenate or erose, often fringed with glands. *Sporangia* small, flattened, the pedicel long and slender, bearing stalked glands, the annulus composed of 13 to 16 indurated cells and 8 to 9 thin-walled cells including a lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, brown or dark brown, the perispore covered with rounded protuberances, equat. diam. 27·13 to 41·25 μ × polar diam. 22·5 to 30 μ. *Glandular hairs* round or sometimes oblong, yellow, orange, dark red or red-brown, freely scattered mainly along the lower surface of the rhachises, costae, costules, minor veinlets and surface of the lamina as well as on the margin and surface of the indusia. (Plate XI, f. 5-6).

Distribution: Philippines, southern India, Ceylon, Formosa, Sumatra, Bali, Fiji, New Caledonia and Australia (north-eastern to central-eastern Queensland).

Holotype: Broad Sound (NE Queensland), picked (on) west hill in shady woods, R. Brown No. 23, Iter Austr., 1802-05 (BM), examined. There is also an Isotype at the Kew Herbarium and a specimen labelled " *Nephrodium tenerum*, East Coast " by Brown.

Specimens Examined:—*Australia, Queensland:* Small coral islands off the coast near Torres Straits, " so scanty was the vegetation that scarcely anything else grew upon them ", Moore (K); Fitzroy Island No. 3, in shady places (MEL); Cook District, The Crater, ca. 11 miles S of Atherton, a fairly common species on the rainforest floor, Smith No. 3830, 8.1948 (BRI); Hypipamee Crater, in open *Eucalyptus-Casuarina* forest, on dry hillside, Messmer 8.1954 (NSW P6929); Dunk Island No. 219 (MEL); Palm Islands, Bancroft No. 67 (BRI); North Kennedy district, Mt. Fox, Kelly scrub, Clemens 11.1949 (BRI); Cleveland Bay, Mueller (MEL); Mt. Elliot, Fitzalan, ex Herb. Mueller, 7.1877 (K; MEL); Port Denison, Fitzalan 1874 (MEL); Mt. Dryander, Kilner & Fitzalan, Herb. F. Mueller (MEL); Fitzroy River, E.A., Herb. F. Mueller (MEL); Fitzroy River, Thozet (MEL); Mt. Archer, Dallachy No. 343, 2.1863 (MEL); Berserker Range, near Rockhampton, Bowman (MEL); ditto, received 7.1877, ex. Herb. F. Mueller (K); Rockhampton, Dietrich No. 503, Luerssen No. 4211 (P); Rockhampton, Thozet No. 110 (MEL); on the side of Mt. Rockhampton, Dallachy 4.1868 (MEL); near Keppel Bay, Herb. F. Mueller (MEL); head of the Dee River, Bowman 1.1867 (MEL); Mt. Perry, Boorman 8.1912 (NSW P4510).

Ceylon: Lady Horton's Walk, Kandy, presented by Mrs. Chevalier 1887 (BM); near Lady Horton's Walk, Kandy, Sledge No. 6 (Univ. Leeds); Corbetts Gap, near Kandy, alt. 4,000 ft., Sledge No. 343 (Univ. Leeds); Ritigala Mt., alt., 2,000 ft., Sledge No. 370 (Univ. Leeds);

near Hinguaragama, Badulla, in a jungle, Freeman No. 256A (BM); Ludagalla, 3,500 ft., Hancock No. 38, 2.1891 (K); without a specific locality, Thwaites CN1374 (K); ex Hort. Kew, Heward's Herb. (K); T. Moore's Fern Herb. No. 1374 (K); Mackenzie, Herb. Soc. Hort. 1839 (K); Gardner No. 1110, Herb. John Smith 1866 (BM) and 1847 (K); Gardner, Hort. Kew 1851, ex Herb. John Smith 1866 (BM); Moon 1819 (BM); Bradford, Herb. Hance No. 1075 (K); G. Wall. (BO 102267); Hancock No. 38 (US 1277194; NSW); Ferguson (US 816431).

India: Southern Hindustan, Noyes, Herb. S. F. Judd (US 299648).

Indonesia, Sumatra: Lörzing No. 9534, 3.1923 (BO 102265). *Bali*, secondary forest, more or less 3 km. N of Kintamani, Holstvoogd No. 832, 3-4.1950 (NSW; L).

Philippines: Province of Batangas, Luzon, Ramos 7-8.1914 (Phil. Bur. Sci. 22363; NSW; US); Neuva Vizcaya Province, Luzon, Ramos 8.1909 (Phil. Bur. Sci. 8161; NSW).

New Caledonia: Dans la forêt, Yahoué, Savès, extrait de l'herbier Debeaux 12.1879 (K; P); forêt d'Yahoué, 100 m. alt., Franc No. 139, 7.1911 (US 1095807-8; NSW P7943; SING); bords de la rivière de Yahoué, ne dépasse pas 300 m., Franc No. 139, 9.1905 (NSW P2383; L 908342 . . . 419; US 566532); Yahoué, in forested gully, terrestrial fern, 50 m. alt., McKee No. 4875, 7.1956 (BM; US; KYO; NSW P7566); bords de la rivière de Yahoué, 300 m. alt., Franc No. 139 β, 9.1909, ex Herb. Bonati (US 1091069); auf den Bergen, bei Paita, 300 m. alt., R. Schlechter No. 14885, 10.1902 (K); Conception, Pancher 1870, Mus. neocal. n. 483 (K); Dumbéa, 100 m. alt., Franc No. 139, 11.1912 (K); forêt claire bord de torrent, Hermitage, 150 m. alt., Franc No. 139, 5.1912 (BRI 507-8; US 1273188; NSW P7236); Col d'Amos, Ouegoa side, 200 m. alt., terrestrial fern, McKee No. 4720, 6.1956 (NSW P7718). Without specific localities:— Baudouin 155, 1865 (K; P); Franc No. 139 (SING; NSW P2384 and P2385); Baron, ex Herb. Jeanpert (US 1431084).

Fiji: Feejee Group, Matuku, woods, high ground, Milne H.M.S. "Herald" No. 144, 8.1855 (K).

Formosa: Prov. Takao, Tona, Kizan-gun, Tagawa No. 1937, 1.1939 (KYO; NSW); Proc. Takao, Tona, Kizan-gun, Tagawa No. 1948, 1.1939 (KYO); Prov. Taitô, between Ebako and Buruburu, Kwanzan-gun, Tagawa No. 3000, 2.1940 (KYO; NSW); Tyokakurai, Ogata 7.1935 (KYO); Prov. Takao, between Masuhoaru and Nakanoseki, Kizan-gun, Tagawa No. 1244, 11.1938 (KYO; NSW); Prov. Takao, between Oogidaira and Nanhôzan, in the basin of the River Sangô-kei, Kizan-gun, Tagawa No. 1375, 12.1938 (KYO; NSW); Baibara, Yoshihide, Saito 9.1926 (KYO).

Absolute Synonyms: *Nephrodium tenerum* R. Br., Prodr. Fl. N. Holl. (1810) 149; *Aspidium tenerum* (R. Br.) Spreng., Syst. IV (1827) 109; *Aspidium decompositum* (R. Br.) Spreng. var. *tenerum* (R. Br.) F. Muell., Fragm. Phyt. Austr. V (1866) 137 (in the text var. *tenera* which is an unintentional orthographic error), partim; *Dryopteris tenera* (R. Br.) C. Chr., Ind. Fil. (1905) 297; *Ctenitis tenera* (R. Br.) Copel., Gen. Fil. (1947) 125.

Equivalent Synonyms: *Polypodium recedens* J. Sm. in Hook. Journ. Bot. III (1841) 394, nomen nudum, Holotype, Luzon, the Philippines, Cuming No. 96 (K), 2 sheets, examined; Isotype, ex Herb. John Smith, 1866 (BM); *Lastrea recedens* J. Sm. ex T. Moore in Gard. Chron. (27.10.1855) 708, c. fig., based on *Polypodium recedens* J. Sm., descr., Holotype, Luzon, Cuming No. 96 (K), examined; *Aspidium gardnerianum* Mett., Farngatt., Pheg. und Asp. (1858) 71, Holotype, Ceylon, Gardner No. 60 (not seen), but it is quite evident from the description that *A. gardnerianum* is synonymous with *L. tenera; Dryopteris recedens* (J. Sm. ex T. Moore) O. Ktze., Rev. Gen. Pl. II (1891) 813; C. Chr., Ind. Fil. (1905) 288; *Dryopteris simozawae* Tagawa in Acta Phytotax. et Geobot. IV (1935) 135; *Lastreopsis recedens* (J. Sm. ex T. Moore) Ching in Bull. Fan Mem. Inst. Biol., Bot. VIII (1938) 161; *Lastreopsis simozawae* (Tagawa) Tagawa in Acta Phytotax. et Geobot. VIII (1939) 169; *Ctenitis recedens* (J. Sm. ex T. Moore) Copel., Gen. Fil. (1947) 124.

L. tenera has the widest range of any species of *Lastreopsis* being found as far north as Formosa, ranging westwards to Southern India and eastwards through Indonesia and the Philippines to Australia and New Caledonia. It varies very little over its range except that the whitish, septate hairs occurring between the veins on the surface of the lamina each have a small, round, glandular head in the material from New Caledonia, Formosa, Bali and in one specimen from Ceylon (viz. US 816431). In the Queensland material and in most of the Singhalese specimens these hairs are acute instead of glandular-tipped. The New Caledonian and most of the Formosan specimens tend to have longer, finer hairs on the lower surface of the frond than in material from other parts of its range.

After an examination of the holotype of *Dryopteris simozawae* Tagawa which was collected by Simozawa No. 768 in Formosa at Musya, prov. Taityû in November 1927 and kindly forwarded on loan by the University of Kyoto, Japan, I have been unable to retain this as a separate species. The indusia in the Formosan material tend to shrivel more quickly, hence they are less evident. They are dark brown or black when old and are usually fringed by dark red, rounded glands. The spores do not differ from those of material from Australia and New Caledonia etc. but are ruguloso-saccate rather than papillate as in the original description of this species.

In the National Herbarium, Melbourne, there is a specimen of *L. tenera* which was supposed to have been collected at Parramatta, N.S.W. (Herb. Mueller) but this must surely be an error, as it is more than 600 miles south of Mt. Perry, Queensland.

This species is sometimes confused with *L. decomposita* especially in Queensland but the old indusia are darker brown to black instead of brown or light brown, the glandular hairs are usually more rounded, the hairs on the surface of the lamina and on the veins are finer, more plentiful and shorter in *L. tenera*, the cell-walls of the scales of the rhizome are thicker also the apices of the ultimate segments are more rounded, subacute, acute or truncate instead of acuminate, mucronate or apiculate.

In Queensland *L. tenera* is sometimes found amongst granite rocks in marginal rainforest with *Agathis*, *Randia* and *Araucaria cunninghamii* e.g. Boyle Creek, Mareeba, McKee No. 9165, 4.1962 (NSW).

A chromosome count of $n = 41$ was recorded for *Lastreopsis tenera* (as *Ctenitis recedens* (J. Sm. ex T. Moore) Copel.) by Manton & Sledge in Phil. Trans. Roy. Soc. London, Ser. B, Biol. Sci. No. 654, Vol. CCXXXVIII (1954) 160. This material which was collected in the jungle near Kandy, Ceylon, was diploid. A chromosome count of $n = 41$ has been made by G. Brownlie on material of *L. tenera* collected at Col des Rousettes, New Caledonia (in press in ‘ Pacific Science ’, published in my monograph by the kind permission of G. Brownlie).

27. Lastreopsis decomposita (*R. Br.*) *Tindale* in Vict. Nat. LXXIII (1957) 183; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 71, pl. IX, f. 2; J. H. Willis, Handb. Pl. Vict. I (1962) 40.

Habitat terrestrial in rainforests (mainly subtropical) or in wet sclerophyll forests, often at comparatively high altitudes especially in the McPherson Range. *Rhizome* shortly creeping, 0·3 to 1·2 cm. in diam., densely clothed with scales which are dark brown, lustrous, acute to acuminate, entire or almost so, narrowly lanceolate (6: 1) to lanceolate (3: 1), 2 to 5 mm. long, 0·5 to 1·2 mm. broad, with dark red or dark yellow lumina in the thick-walled cells. *Stipes* crowded on the rhizome, up to 50 cm. long, 1·5 to 5 mm. broad near the middle, fawn, light brown to brown, dull, slightly to very scabrous, red-brown or dark brown at the base, not winged, with 2 prominent ridges on the upper surface, the shallow intervening channel clothed with substrigose, red-brown or brown, acute or obtuse hairs, clothed near the base of the stipes with scales which are squarrose, brown or dark brown, long-acuminate, entire or almost so, glossy, cultrate (more than 6: 1) to lanceolate (3: 1), up to 8 mm. long and up to 1 mm. broad, clothed on the lower surface of the stipes towards the middle and upper portions with short, acute or glandular-tipped, spreading, fawn, *Ctenitis*-like hairs (3 to 6 cells long) and a few, scattered, dark brown scales. *Main rhachis* not winged except at the apex (but displaced pinnules common), light brown, brown, fawn or yellowish-fawn, dull, slightly scabrous, with 2 ridges on the upper surface, the shallow intervening channel and raised median band with substrigose hairs, the lower surface of the main rhachis densely pubescent with soft, acute or sometimes glandular-tipped, short, fawn or brown *Ctenitis*-hairs and a few, dark brown scales; gemmiferous bulbils absent. *Fronds* including the stipes up to 90 cm. long. *Lamina* 25 to 50 cm. long, 15 to 50 cm. broad, almost 4-pinnate at the base, markedly catadromous, thinly herbaceous to almost subcoriaceous or sometimes submembranous, rather rigid, never flaccid, medium green, darker and sometimes rather glossy on the upper surface, otherwise dull, slightly broader than long, quinquangular, the apex acute to acuminate. *Primary pinnae* with densely hairy petiolules, the upper winged, usually closely spaced, often slightly imbricate, the lower spreading or suberecto-patent, often opposite throughout or the lower pinnae and the upper subopposite, the apex acute or subacuminate, the basal pair obliquely ovate (3: 2) to broadly ovate (6: 5), 19 to 35 cm. long, 8 to 25 cm. broad, unequally deltoid, basiscopically produced. *Secondary pinnae* shortly stalked or sessile, usually with a basiscopic pinnule on the secondary rhachis, distant, alternate, up to 12 cm. long, up to 5 cm. broad, obliquely narrowly lanceolate (6: 1) to obliquely narrowly ovate (2: 1), the apex acute to acuminate. *Tertiary segments* with winged petiolules, subdistant, alternate, mostly 1 to 4·6 cm. long, 0·1 to 1·2 cm. broad, obliquely narrowly lanceolate-oblong (6: 1) to obliquely lanceolate-oblong (3: 1), the apex apiculate, the base decurrent on the costa. *Ultimate segments* slightly constricted at the base, lanceolate (3: 1) to narrowly ovate (2: 1), mostly up to 10 mm. long and up to 3 mm. broad, the apex acuminate, mucronate or apiculate, the margin otherwise entire or slightly serrulate, the basiscopic margin slightly thickened, the upper and lower surfaces with a few, scattered setae between the veins. *Basiscopic pinnules* often displaced downwards, borne on the main rhachis as well as on the secondary and tertiary rhachises. *Veins* free, very oblique, catadromous, the minor veinlets from the midnerve of the ultimate segments simple, forked or pinnate. *Secondary and tertiary rhachises* clothed with scales which are dark to light brown, acute to long-acuminate, glossy, bullate, narrowly lanceolate (6: 1) to ovate (3: 2), up to 1 mm. long. *Costae* very densely clothed with short, fawn or whitish hairs. *Costules* and *minor veinlets* more sparsely pubescent with similar hairs. *Sori* indusiate, superficial, very numerous, medial on simple minor veinlets or terminal on the distal branch of the minor veinlets from the midrib of each ultimate segment, closer to the margin than to the midrib but not in an almost marginal row as in *L. marginans*. *Indusium* orbicular-reniform, brown or light brown, darker towards the centre, thin, firm, subpersistent, 0·1 to 1 mm. in diam., the margin glandular-fimbriate, the surface with a few, very long, white, setaceous hairs or sometimes glabrous. *Sporangia* with an annulus composed of 12 to 15 indurated cells and 6 to 8 thin-walled cells including the lateral stomium, the pedicel long and slender with 1 or 2 oblong, glandular hairs. *Spores* bilateral, monolete, brown, globose-ellipsoidal or rarely globose, the perispore ruguloso-saccate, the elevations either elongate and comparatively slender or broader and rounded, equat. diam. 26·25 to 30 μ × polar diam. 18·75 to 24·38 μ. *Glandular hairs* oblong, appressed, unicellular, red, orange or yellow, scattered along the costae, costules, minor veinlets, the surface of the lamina as well as the margin and surface of the indusia. (Plate IX, f. 2).

DISTRIBUTION: Norfolk Island, Australia (south-eastern Queensland from the coastal regions to as far west as the Bunya Mountains, the Coast and Tablelands of New South Wales and far eastern Victoria).

HOLOTYPE: Hunter River, R. Brown No. 22 Iter Austr., 10.1804 (BM, examined). ISOTYPE (K).

SPECIMENS EXAMINED:—*Queensland:* Booloumba Creek, Little Yabba Forest Reserve, near Conondale, very robust fern in rainforest bordering a creek, rhizome robust, very shortly creeping, Goy & Smith No. 660, 4.1939 (BRI); Bunya Mountains, R.A.O.N. Excursion, White 10.1919 (BRI); Mt. Glorious, tufted fern on hillside on edge of rainforest, fronds 2 to 3 ft. high, pale green, base of the stipes very scaly, Goy No. 196, 6.1937 (BRI); Moreton District, Upper

Cedar Creek, near Mt. Glorious, Smith 1940 (BRI); Cainbable Range, ca. 10 miles SW of Canungra, in rainforest on plateau with *Adiantum formosum*, *Lastreopsis munita* and *Pellaea falcata* var. *nana*, alt. ca. 2,000 ft., Smith & Tindale 8.1956 (NSW P7443; MEL); near Mt. Nebo, ca. ½ mile W of the junction of the road from Samford with the road to Mt. Glorious, alt. ca. 1,400 ft., in rainforest gully near creek, Smith & Tindale 8.1956 (NSW P7437); Toowoomba, Stephenson (NSW P4513): Tambourine Mountain, Longman & White 2.1917 (BRI); Natural Bridge, Numinbah Valley, large tufted fern in rainforest, alt. about 900 ft., Goy & Smith No. 546, 10.1938 (BRI); Moran's Creek, Lamington National Park, alt. about 1,500 ft., common in rainforest, Goy & Smith No. 122, 1.1938 (BRI; NSW P4610); ditto, very common in rainforest at the foot of the falls, Goy & Smith No. 117, 1.1938 (BRI); Lamington National Park, in rainforest, 3,000-3,700 ft. alt., rhizome creeping, fronds distant, pale to dark green, 1 to 2 ft. high, Blake No. 12993, 5.1937 (BRI); Rathdowney, Boorman 8.1916 (NSW P4514); Killarney, no collector, 10.1891 (BRI); Mt. Lindsay, border of N.S.W. and Queensland, White 10.1921 (BRI); ditto, Boorman 3.1916 (NSW P4516).

New South Wales: Acacia Plateau, in rainforest gully, red basalt soil, Constable 5.1947 (NSW P5962); Uki, Tweed River, North Arm, Boorman 8.1916 (NSW P4508); Wiangarie State Forest, ca. NE of Kyogle, 2,000 ft. alt., occasional in rainforest gully, basalt, Constable 1.1953 (NSW P6489); Toonumbar, in rainforest near creek, basalt country, Constable 4.1947 (NSW P5989); Rivertree, Upper Clarence River, Cambage No. 2869, 9.1911 (NSW P4517); Gibraltar Range State Forest, 30 miles NE of Glen Innes, plentiful in dense rainforest gully . . . near creek, 2,200 ft. alt., Constable 4.1956 (NSW P7387; BM); Copmanhurst, Rupp 8.1909 (NSW P4512); Dorrigo, Boorman 2.1916 (NSW P4479); Comboyne, Chisholm 1.1934 (NSW P4478); Bulgong Heights, Watts 5.1916 (NSW P4518, P4519, P5100); Bulga Creek, via Wingham, Watts 4.1915 (NSW P4612); Upper William's River, Tindale 9.1945 (NSW P122); Nabiac, via Taree, along rocky creek banks in rainforest, Gilbert 6.1946 (NSW P1301); ditto, near rainforest in gully, Gilbert 10.1947 (NSW P169); Dyer's Crossing, in rainforest on hillside beside creek, Gilbert 7.1946 (NSW P567, P560); Wattagan State Forest, ca. S of Cessnock, 400 ft. alt., 12 to 30 inches high, plentiful under cliffs in rainforest, Constable 9.1954 (NSW P7051; BM); Newport, Pittwater side, on shady hillside in *Eucalyptus* forest, Tindale 2.1948 (NSW P5180; US); ditto, Tindale 8.1946 (NSW P5391); McCarr's Creek, near Church Point, Tindale 4.1945 (NSW P51; P46); Lindfield, Messmer (NSW P4482); Kurrajong, Stephenson (NSW P4481); ditto, Woolls (NSW P4477); Leura Gully, Stephenson 12.1890 (NSW P4483); Mt. Irvine, Haigh 8.1942 (NSW P77); Garie Beach, National Park district, in rainforest gully, Tindale & Constable 10.1952 (NSW P7237; K; L; MO); Stanwell Park, Boorman 5.1906 (NSW P4611); Otford, Camfield 11.1897 (NSW P4480); Bulli Pass, Rupp 4.1916 (NSW P4515); Mt. Kembla, Fletcher 11.1891 (NSW P4476, P4511); ditto, Deane 9.1891 (NSW P4608); Jamberoo, Camfield 12.1899 (NSW P4485); Milton, Brown 10.1912 (NSW P4524); NE Slopes of Mt. Dromedary, Central Tilba, 2 to 3 ft. high, abundant in rainforest, Constable 9.1953 (NSW P6699; K; L; BO); Eden, Wakefield 12.1940 (MEL).

Absolute Synonyms: *Nephrodium decompositum* R. Br., Prodr., Fl. N. Holl. (1810) 149; *Aspidium decompositum* (R. Br.) Spreng., Syst. IV (1827) 109; Benth., Fl. Austr. VII (1878) 758-9, partim?; F. M. Bail., Lith. Ferns Queensl. (1892) t. 137; Moore & Betche, Handb. Fl. N.S.W. (1893) 513, partim; *Lastrea decomposita* (R. Br.) J. Sm., Cat. Cult. Ferns (1857) 56; *Dryopteris decomposita* (R. Br.) O. Ktze., Rev. Gen. Pl. II (1891) 812; C. Chr., Ind. Fil. (1905) 260; Maiden & Betche, Census N.S.W. Pl. (1916) 2; Wakefield in Vict. Nat. LX (1944) 156; *Parapolystichum decompositum* (R. Br.) Ching in Sunyatsenia V (1940) 239; *Ctenitis decomposita* (R. Br.) Copel., Gen. Fil. (1947) 124.

Equivalent Synonyms: *Nephrodium lancilobum* Bak. in Hook. & Bak., Syn. Fil. (1874) 499; *Lastrea lanciloba* (Bak.) J. Sm., Ferns Brit. & Foreign, ed. II (1877) 305; *Dryopteris lanciloba* (Bak.) O. Ktze., Rev. Gen. Pl. II (1891) 813; Domin in Bibl: Bot. LXXXV (1913) 39.

According to Wakefield, Ferns of Victoria and Tasmania (1955) 46, this species has been recorded only once from Victoria, i.e. at Mallacoota Inlet, opposite the Gipsy Point settlement.

L. decomposita is a polymorphic species but the variation is so gradual that I have not been able to keep any form distinct. On the whole the forms having a thin lamina with narrow ultimate segments, as in the holotype, have darker, silkier, thinner paleae on the stipes and rhizomes. A specimen collected by W. W. Watts at Bulga Creek, Bulga Heights, N.S.W., in April 1915 (NSW P4520), agrees very well with the holotype in the British Museum of Natural History.

Nephrodium lancilobum Bak. was based on specimens collected in Queensland by Dallachy and Hutchinson. However in 1951 I was unable to find any specimens of this fern at Kew Herbarium obtained by these two collectors so labelled as *N. lancilobum* by Baker nor was Prof. R. E. Holttum able to find them in 1963. I have examined the following specimens determined as *N. lancilobum* by Baker at Kew:—Clarence Coast, Australia, Mueller (K); Hort. Glasnevin, from New Holland No. 15, Dr. Moore, received 11.1873 (K); Herb. Carbonel, 12.1867 (K). *N. lancilobum* is the form of *Lastreopsis decomposita* with broad, thick ultimate segments of the lamina, also the scales of the rhizome are a lighter brown and the scales of the base of the stipes are more fugacious than in those specimens close to the holotype. A specimen collected at Olney State Forest by Constable (NSW P6253) agrees well with the specimens of *Nephrodium lancilobum* determined by Baker.

There is every gradation between specimens in which the ultimate segments of the lamina are 3 to 5 mm. broad, e.g. Goy No. 196 from Mt. Glorious, South-eastern Queensland, and NSW P7443 which was collected by Smith and Tindale in the Cainbable Range, SE Queensland. The latter specimen is characterized by very narrow ultimate segments of the lamina, i.e. only 1 to 2 mm. broad. These two collections represent extreme forms of *L. decomposita* but similar specimens are scattered throughout the range of this species.

There is a good deal of variation in the shape of the tubercles on the spores of *L. decomposita.* However there is no correlation between specimens with broad or narrow ultimate segments and spores with narrow and conical or broad and flattened protuberances. In Goy No. 196 the tubercles of the spores are very narrow but the ultimate lobes of the lamina are broad, whereas in NSW P7443 with very narrow laminal segments the tubercles are similarly narrow.

I have also examined three collections of *L. decomposita* in which the lower surface of the stipes and rhachises are quite glabrous. They are as follows: SOUTH-EASTERN QUEENSLAND: Pine Mountain, Field Naturalists' Club, 3.1907 (BRI); Camp Mountain, near Brisbane, covering a large area in a gully verging on a small patch of rainforest near the summit, Goy & Smith No. 423, 5.1938 (BRI); Camp Mountain, near Brisbane, common in rainforest near the summit, fronds pale green, Goy & Smith No. 446, 5.1938 (BRI).

The above three specimens represent the commonest form of *L. decomposita* (other than the glabrous surface of the stipes and rhachises) i.e. the pinnules are narrow but in a fourth specimen viz. Goy & Smith No. 425 from Camp Mountain, the pinnules are broad.

A chromosome count of $2n = 82$ was obtained by Barbara Briggs on cultivated material of *Lastreopsis decomposita* originally obtained by E. F. Constable at Toonumbar, North Coast, N.S.W. The voucher specimen is labelled " Neutral Bay, N.S.W., cultivated, M. Tindale 1.1964 (NSW P8576)." This chromosome count is being published here with the kind permission of Dr. Briggs.

28. Lastreopsis silvestris *D. A. Smith ex Tindale* in Bull. Jard. Bot. de l' État, Brux. XXVII (1957) 199; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 77.

Habitat terrestrial in *Nothofagus moorei* temperate rainforests or in subtropical rainforests bordering the latter, on mountainsides usually between 3,000 to 3,800 ft. altitude. *Rhizome* long-creeping, 7 to 17 mm. broad, densely clothed with scales which are dark brown or almost black, not persistent in the older parts, rather glossy, acuminate, 5 to 6 mm. long and 0·5 to 1 mm. broad, entire or with a few, marginal processes or occasionally with a few, sessile, yellow glands along the margin. *Stipes* about 55 cm. long, 2·5 to 4·5 mm. in diam. near the middle, brown, dull, not winged, densely villous with fuscous or ferruginous hairs, scabrous, tuberculate towards the base, clothed near the base with similar scales to those on the rhizome. *Main rhachis* not winged except at the extreme apical portion, brown, villous with fuscous or ferruginous hairs, scabrous on the lower surface, very broadly and very shallowly furrowed on the upper surface, the margins of the ultimate pinnules decurrent as 2 ridges on the main and other rhachises, the raised median band and the channel densely clothed with hairs which are fuscous, 5- to 7-celled and articulated; gemmiferous bulbils absent. *Fronds* up to 1 m. high including the stipes. *Lamina* 30 to 60 cm. long, 22 to 60 cm. broad, 4-pinnate or sometimes 4-pinnate-pinnatifid, catadromous, quinquangular, herbaceous, dark green above (drying dull and dark brown), paler below, the apex acuminate. *Primary pinnae* with wingless, villous petiolules which are 0·4 to 4 cm. long in the lower and middle pairs, the upper pairs sessile with a short, basal pinnule often decurrent on the main rhachis, 17 to 36 cm. long, 9 to 17 cm. broad, usually distant, obliquely narrowly ovate (2: 1) to broadly ovate (6: 5), 4- to 16-jugate, the basal pair the largest, the apex acuminate. *Secondary pinnae* with the lower pairs shortly stalked, the upper sessile with a short, basiscopic pinnule mostly adnate to the secondary rhachis, the lower pairs narrowly ovate (2: 1) to lanceolate (3: 1), the upper lanceolate-rhomboidal (3: 1 or 4: 1), 14- to 20-jugate, the larger pairs mostly 6·5 to 10·5 cm. long and 2 to 4·2 cm. broad, the apex acuminate. *Tertiary segments* sessile except the lower pairs which are shortly stalked, with a short basiscopic pinnule mostly adnate to the tertiary rhachis in the upper and middle pairs, more or less oblong-rhomboidal, 10- to 14-jugate, decurrent, obliquely cuneate at the base, mostly 1 to 2·5 cm. long and 0·5 to 0·9 cm. broad, the apex acute. *Quaternary segments* sessile except sometimes the basal pair shortly stalked, oblong-rhomboidal or the upper segments oblong, 6- to 10-jugate, the lower deeply lobed with oblong lobes, the apex broadly obtuse and slightly crenate. *Veins* free, simple, pinnate or forked, catadromous, not reaching the margin, not prominent on the lower surface; costae, costules and minor veinlets villous below with fuscous or ferruginous hairs and clothed above with shorter, stiffer, fuscous or ferruginous hairs or sometimes with the costules and minor veinlets almost glabrous on the upper surface, the hairs intermixed with rather numerous, dark brown, acuminate, bullate, more or less ovate scales on the lower surface. *Sori* numerous, indusiate, orbicular, half-way between the margin and the midrib, 0·4 to 1 mm. in diam., subterminal on the minor veinlets or on their fork. *Indusium* orbicular-reniform, 0·2 to 0·5 mm. in diam., dark brown or brown, thin, fairly persistent, the margin entire or erose, with a few, very long, brownish, unbranched hairs towards the centre. *Sporangia* small, the pedicel narrow and slender, without oblong glandular hairs; annulus composed of 13 to 16 thick-walled cells and 6 to 8 thin-walled cells including the lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, dark brown, the surface of the perispore covered with balloon-like protuberances, equat. diam. 33·75 to 37·5 μ × polar diam. 22·5 to 26·25 μ. *Glandular hairs* oblong, appressed, unicellular, yellow or orange, chiefly scattered along the lower surface of the stipe, main rhachis, costae, costules, minor veinlets and lamina but a few are also found on the upper surface of the frond and scattered on the indusia.

Distribution: Australia (McPherson Range, on the border of Queensland and New South Wales).

Holotype: McPherson (Macpherson) Range, about 3,500 ft. alt., very abundant, C. T. White 12.1918 (BRI); Isotype (NSW P1525) at the National Herbarium, Sydney.

Specimens Examined:—*Queensland:* Roberts' Plateau, Lamington National Park, alt. 3,000 ft., on steep mountainside beside the track to Lightning Falls, fronds 3 ft. high, Goy & Smith No. 175, 1.1938 (BRI); Lamington National Park, from near Lightning Falls turnoff to Bithongabel, in rainforest adjoining and in *Nothofagus moorei* forest, a terrestrial fern 1½ to 3½ ft. high, alt. ca. 3,500 to 3,800 ft., Smith No. 10903, 3.1960 (BRI; NSW); Roberts' Plateau, Shirley No. 21, 5.1918 (NSW P1524); Lamington National Park, in antarctic beech forest (*Nothofagus* etc.), 3,700 to 3,800 ft. alt., rhizome creeping, fronds suberect to 3 ft. high, dark green above, paler beneath, Blake No. 12983, 5.1937 (BRI; NSW); Lamington National Park, McPherson Range-Mt. Merino, in *Nothofagus* forest, 1,130 m. alt., rhizome creeping, fronds loosely tufted, erect with an oblique, dark green blade, paler beneath, rhachis with a rusty indumentum, Blake No. 20417, 8.1958 (BRI; NSW); Lamington National Park, McPherson Range, NE slopes of Mt. Hobwee, in rainforest, 1,030 m. alt., rhizome horizontal, fronds approximate but stipe ascending so that they are loosely tufted, up to 1 m. long, dark, slightly shining green, paler and duller beneath, Blake No. 20607, 8.1959 (BRI; NSW); McPherson Range, Lahey, Tryon and White 2.1912 (NSW P1347).

This species has a rather restricted distribution, as it has not been recorded from any localities other than in the McPherson (Macpherson) Range which is on the border of Queensland and New South Wales, Australia. It prefers comparatively high altitudes, being found in localities between 3,000 and 3,800 ft. above sea level in these mountains especially near the mist region.

The two ridges on the upper surface of the main rhachis are less prominent than in most species of *Lastreopsis* but they may be readily seen by rubbing off the long hairs covering them. The thickening of the margin of the ultimate segments is also not as marked as in many species of this genus but the margin is continuous with the two ridges on the rhachises as in all the species of *Lastreopsis*.

This species is allied to *Lastreopsis microsora* (Endl.) Tindale which is common in eastern Australia, having a superficial resemblance to the villous form of the latter species once known as *Dryopteris albovillosa* W. W. Watts. However, the rhizome is more robust and the fronds are usually more finely divided in *L. silvestris*, also the margin of the ultimate segments is entire or crenate instead of spinulose-dentate as in *L. microsora*.

Another closely related species is *L. decomposita* (R. Br.) Tindale which occurs in the rainforests of south-eastern Australia but the fronds of the latter are mostly smaller and the apices of the ultimate segments apiculate instead of obtuse.

29. **Lastreopsis exculta** (*Mett.*) *Tindale* in Vict. Nat. LXXIII (1957) 185.

Key to the Subspecies

1. Primary and secondary rhachises not densely paleaceous.
   2. Secondary pinnae mostly 1 to 2 cm. broad (other than the basal basiscopic pair). Lamina 40 to 50 cm. long, about 25 to 30 cm. broad .. ssp. *exculta* a.
   2.* Secondary pinnae mostly 0·5 to 1 cm. broad (other than the basal basiscopic pair). Lamina mostly 15 to 30 (rarely up to 40) cm. long, 9 to 15 (rarely up to 20) cm. broad .. .. ssp. *guatemalensis* b.

1.* Primary and secondary rhachises rather densely clothed with more or less lanceolate, subentire, red-brown or brown, thin scales .. .. ssp. *squamifera* c.

a. **L. exculta** ssp. **exculta**

The type subspecies is a larger fern than ssp. *guatemalensis*, the chartaceous lamina being usually 40 to 50 cm. long and 25 to 30 cm. broad. The main and secondary rhachises are not densely paleaceous as in ssp. *squamifera* but the secondary rhachises are very sparsely pubescent on their lower surface especially towards the base. The tertiary laminal segments in ssp. *exculta* are less sharply toothed than in ssp. *guatemalensis*. The indusia covering the sori of the former subspecies are brown or dark brown and persistent. Yellow, oblong, glandular hairs are found on the lower surface of the lamina in ssp. *exculta*. All three subspecies are characterized by gemmiferous bulbils on the rhachises.

L. exculta is very closely allied to *L. effusa*, another species found in Tropical America, but it may be readily distinguished from the latter by the large, persistent indusia, also the apical portion of the frond is usually more attenuated in *L. exculta*.

DISTRIBUTION: Venezuela and Colombia.

HOLOTYPE: Tovar, in nemoribus, locis saxosis subapertis, Moritz No. 433 (B), not examined. ISOTYPE: (GH), examined.

SPECIMEN EXAMINED:—*Venezuela:* Tovar, Fendler No. 330, 1856-57 (GH).

ABSOLUTE SYNONYMS: *Aspidium excultum* Mett., Aspid. (1858) 69, t. 17, f. 9. *Dryopteris exculta* (Mett.) C. Chr., in Monogr. Dry. II (1919) 1920, 95.

b. Lastreopsis exculta ssp. **guatemalensis** (*Bak.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1963) 245.

Habitat terrestrial in dense tropical rainforests. *Rhizome* long-creeping, 2 to 6 mm. in diam., clothed with scales which are fugacious, dark brown or brown, acuminate, thin, papery, entire, linear (12: 1) to narrowly lanceolate (6: 1), 3 to 5 mm. long and 0·3 to 1 mm. broad, the cells thin-walled and hexagonal with pale yellow lumina. *Stipes* scattered along the rhizome, ca. 12 to 40 cm. long, 0·5 to 1·5 mm. broad near the middle, light brown, fawn or brown, dark brown towards the base, not winged, dull or slightly glossy on the lower surface, grooved on the upper surface, tomentose in the channel near the apex, almost glabrous on the lower surface except for a few, 3- to 5-celled *Ctenitis*-hairs especially near the apex, clothed near the base with similar scales to those on the rhizome. *Main rhachis* very narrowly winged towards the middle and apex, light brown or fawn, dull, smooth, tomentose with club-shaped or obtuse, 2- to 3-celled *Ctenitis*-hairs on the raised portion in the channel, the lower surface clothed with stiffly spreading, obtuse, 2- to 4-celled *Ctenitis*-hairs; gemmiferous by scaly bulbils near the apex. *Fronds* including the stipes 25 to 75 cm. long. *Lamina* 15 to 30 (rarely up to 40) cm. long, 9 to 15 (rarely up to 20) cm. broad, 3-pinnate-pinnatifid or in small fronds 3-pinnate, catadromous at the base only, bright green, slightly paler on the lower surface, thinly herbaceous to subcoriaceous, quinquangular, the surface between the veins without septate hairs but oblong, glandular hairs often numerous, the apex long-attenuated from the broad base of the lamina. *Primary pinnae* 13 to 18 pairs, the petiolules not winged in the lower pairs or all winged, the upper pairs sessile and decurrent on the main rhachis, distant to closely spaced, 10- to 14-jugate, usually the lowest pair enlarged, basiscopically produced, 5 to 18 cm. long, 2·5 to 14 cm. broad, obliquely narrowly ovate (2: 1) to broadly ovate (6: 5), the apex long-acuminate with a serrated portion or sometimes acute. *Secondary rhachises* very narrowly and evenly winged throughout their whole or almost their whole length, tomentose above. *Secondary pinnae* 6- to 11-jugate, with stalked petiolules, closely spaced, the lowest pairs the largest, 3 to 6 cm. long, 1 to 3 cm. broad, obliquely lanceolate (3: 1) to ovate (3: 2), the apex acute to broadly rounded but with rather sharp teeth. *Tertiary segments* or *pinnae* sessile or wingless in the basal pairs in large fronds, more or less oblong, the margin sharply toothed, the apex acute, sometimes again dissected almost to the midrib. *Veins* free, forked or pinnate in the ultimate segments, not reaching the margin, the lower surface of the costae and costules clothed with patent, 2- to 4-celled, obtuse *Ctenitis*-hairs, the minor veinlets on both surfaces glabrous or with a few, 2-celled *Ctenitis*-hairs, the upper surface of the costae and costules densely clothed with fawn, matted, 2- to 3-celled, brownish, obtuse or club-shaped *Ctenitis*-hairs. *Sori* indusiate, superficial to submarginal, orbicular, medial or subterminal on simple veinlets or just above the fork or subterminal on the acroscopic branchlet in forked veins, 0·5 to 1 mm. in diam., slightly pustulate, sometimes occurring at the base of the teeth. *Indusium*

0·3 to 1 mm. in diam., orbicular-reniform, brown, persistent, glabrous or with a few, oblong, orange, glandular hairs on the surface and margin, the latter entire or irregularly crenate. *Sporangia* with the pedicel long and narrow, often with 1 or 2 oblong, orange, red or yellow, stalked glands, the annulus composed of 12 to 14 indurated cells and about 7 to 8 thin-walled cells. *Spores* bilateral, monolete, globose-ellipsoidal, black or dark brown, with acute tubercles and a few, longer, broadly rounded crests, equat. diam. 28·13 to 35·63 μ × polar diam. 22·5 to 24·38 μ, the protuberances 1·88 to 3·75 μ high. *Glandular hairs* oblong, appressed, unicellular, orange, dark red or yellow, densely clothing the lower surface of the rhachises, costae, costules, minor veinlets and surface of the lamina, absent on the upper surface, occasionally present on the indusia.

Distribution: Central and South America (Mexico, Guatemala, Costa Rica, Panama, Colombia and Ecuador).

Syntype: Chiapas, Mexico, Ghiesbreght No. 422, 1864-70 (GH), examined.

Lectotype: Choelum (?), Guatemala, Salvin & Godman (K), not seen. This was chosen as the lectotype of *Nephrodium guatemalense* Bak. by Christensen in Monogr. Gen. *Dryopteris* II (1919) 1920, 96.

Specimens Examined:— *Mexico:* Finca Mexiquito, Chiapas, Purpus No. 6724, 7.1913 (GH; NSW; US); Chiapas, Ghiesbreght No. 232A, 1864-70 (GH).

Guatemala: without specific locality, Salvin (GH; K), perhaps a duplicate of the lectotype as it is labelled *Lastrea* n. sp. by Baker.

Costa Rica: Vicinity of El General, Prov. San José, alt. 1,190 m., Skutch No. 2331, 12.1935 (GH); Los Diamantes, U.S.D.A. Rubber Plant Station, Prov. de Limón, in moist woods near river, ca. 1,000 ft. alt., Scamman No. 5935, 4.1951 (GH); Suerre, Llanuras de Santa Clara, alt. 300 m., Donnell Smith No. 6896, 4.1896 (GH); Turrialba, near Interamerican Institute, Prov. de Cartago, in woods, ca. 2,000 ft., Scamman No. 5934, 3.1951 (GH; NSW); Bois de San Pedro près San Ramon, 1,300 m. alt., Tonduz No. 17568, 4.1913 (NSW P8449); La Concepcion, Llanuras de Santa Clara, alt. 250 m., Donnell Smith No. 6907, 2.1896 (GH).

Panama Canal Zone: near Frijoles, in dense forest, Killip No. 2903, 5.1918 (GH; US).

Panama: Hills behind Fish Creek, vicinity of Chiriqui Lagoon, Prov. de Bocas del Toro, von Wedel No. 2312, 4.1941 (GH).

Absolute Synonyms: *Nephrodium guatemalense* Bak. in Hook. & Bak., Syn. Fil. ed. 2 (1874) 498; *Dryopteris guatemalensis* (Bak.) O. Ktze., Rev. Gen. Pl. II (1891) 812; C. Chr., Ind. Fil. (1905) 269; *Aspidium guatemalense* (Bak.) Christ in Bull. L'Herb. Boiss. II (1906) 56.

c. **L. exculta** ssp. **squamifera** (*C. Chr.*) *Tindale* in Contrib. N.S.W. Nat. Herb. III (1963) 245.

The primary and secondary rhachises are clothed with scales which are red-brown or brown, thin, subentire and more or less lanceolate. The lower surfaces of the fronds are densely clothed with dark red, oblong, appressed, glandular hairs. The indusia are usually light brown towards the margin and darker towards the centre. The spores are black, tuberculate and with a few larger crests as in ssp. *guatemalensis*.

Distribution: Costa Rica and Mexico.

Syntypes: Navarro, Costa Rica, Wercklé Nos. 16741, 16753 and 16764 (P), not examined.

Specimens Examined:—*Mexico:* Vera Cruz, Schaffner 1900 (NSW P8448).

Costa Rica: Navarro, 1,500 m. alt., Torres No. 206, 2.1924 (US; NSW).

Absolute Synonym: *Dryopteris exculta* (Mett.) C. Chr. in Monogr. Dry. II (1919) 1920, 95 var. *squamifera* C. Chr. in Monogr. Dry. II (1919) 1920, 96.

30. Lastreopsis calantha (*Endl.*) *Tindale* in Vict. Nat. LXXIII (1957) 184.

Habitat terrestrial in forests. *Rhizome* widely creeping, 4 to 7 mm. broad, clothed with scales which are fugacious, dark brown, the margins light brown, long-acuminate, thin, papery, dull or lustrous, entire, linear to narrowly lanceolate, 2·5 to 8 mm. long, 0·5 to 1·2 mm. broad. *Stipes* scattered along the elongated rhizome at intervals of 0·5 to 1·2 cm. apart, 12 to 32 cm. long, 1 to 3 mm. broad near the middle, pinkish fawn, fawn or light brown, glossy, smooth to very scabrous, glabrous on the lower surface, ridged above, tomentose on the upper surface in the channel, the scales of the base of the stipe similar to those on the rhizome. *Main rhachis* winged towards the apex, without displaced pinnules, fawn, light brown, pale green, stramineous or chestnut-coloured, glossy, the lower surface glabrous except at each junction with a secondary rhachis where there is a matted tuft of glossy, unbranched, brownish or fawn hairs with yellow or dark red septa, as well as an occasional, dark brown scale, the upper surface densely clothed on the raised median portion and in the channel with fine, matted, obtuse, fawn, 3- to 7-celled *Ctenitis*-hairs; gemmiferous bulbils absent. *Fronds* including the stipes 25 to 120 cm. long. *Lamina* usually 20 to 50 cm. long, usually 15 to 40 cm. broad, 3-pinnate-pinnatifid to almost 4-pinnate, 3-pinnate in young fronds, catadromous at the base, otherwise anadromous, dark green to medium green, slightly paler beneath, herbaceous, quinquangular, both surfaces glabrous or rarely with a few, very scattered *Ctenitis*-hairs between the veins, a tuft of fawn hairs often at the sinus, the apex shortly acuminate. *Secondary rhachises* narrowly winged towards the apex and middle, not winged near the base, almost glabrous below with a few, scattered, 3- to 6-celled, spreading *Ctenitis*-hairs, clothed above as on the main rhachis. *Primary pinnae* 7 to 14 pairs, stalked except near the apex of the frond, the petiolules 0·5 to 1·5 cm. long, wingless in the basal pairs, widely spaced especially the basal pairs, oblique, the lowest pair the largest, basiscopically produced, 6 to 30 cm. long, 4·5 to 22 cm. broad, obliquely ovate-deltoid (3: 2) to broadly ovate-deltoid (6: 5), the apex acute to acuminate. *Secondary pinnae* 11- to 17-jugate, the petiolules pubescent, wingless only in the lowest pair, the latter much enlarged, obliquely lanceolate (3: 1) to narrowly ovate (2: 1), 6·5 to 14 cm. long and 2 to 5 cm. broad, the apex acuminate to acute. *Tertiary pinnae* with winged petiolules, 5- to 6-jugate, the largest 2·5 to 3 cm. long, 1 to 1·5 cm. broad, obliquely narrowly ovate (2: 1), the apex acute to obtuse. *Ultimate segments* sessile or with winged petiolules, more or less oblong, the apex broadly rounded, toothed, the margin spinulose-dentate to almost crenate. *Veins* free, simple, forked or pinnate in the ultimate segments, not reaching the margin, the lower surface of the costae, costules and minor veinlets glabrous or almost so except for a tuft of fawn, obtuse, septate hairs at the base of the costae, the upper surface similar. *Sori* indusiate, orbicular, medial, up to 1·5 mm. in diam., medial to terminal on simple veinlets, at or above the fork of bifurcating veinlets being borne on the acroscopic branchlet. *Indusium* 0·5 to 1·5 mm. in diam., orbicular-reniform with a closed sinus, thin, firm, very persistent, brown to dark brown, not darker towards the centre, glabrous, the margin entire or more or less irregularly lobed, with a few, oblong, yellow, appressed glandular hairs along the margin and sometimes towards the centre. *Sporangia* with a long, narrow pedicel often bearing a yellow, oblong gland, the annulus composed of 12 to 15 indurated cells and about 6 thin-walled cells. *Spores* bilateral, monolete, globose-ellipsoidal, brown to almost black, ruguloso-saccate, equat. diam. 26·25 to 28·13 μ × polar diam. 22·5 to 24·38 μ including the crests which are up to 5·64 μ high and up to 11.25 μ long. *Glandular hairs* oblong, appressed, unicellular, yellow, scattered along the lower surface and very sparsely on the upper surface of the rhachises, costae, costules, lamina and indusia.

Distribution: Norfolk Island.

Holotype: Ins. Norfolk, Ferd. Bauer (W). This type agrees well with a specimen labelled " Ins. Norfolk, Mar. Pacif., Paterson " in the British Museum of Natural History.

SPECIMENS EXAMINED:—*Norfolk Island:* SE slope just below the summit of Mt. Bates, in damp undergrowth, Ralston 8.1962 (NSW P8446); ditto, medium-sized plants but mostly up to 4 ft. or more in height, the 2 small plants silvery, Ralston 11.1962 (NSW P8445). Without specific localities:— Rabone 3.1934 (NSW P4887); Robinson 1902 (NSW P3088 and P5612); Metcalfe 2.1905 (NSW P5611); Paterson (BM); Simmons 10-12.1849 (BM); without collector (NSW P7515); Metcalfe (WELT P3170); Purchas (WELT P3171 A & B).

This species is very closely allied to *L. microsora* which is found in Australia and New Zealand. In *L. calantha* the tuft of hairs which occurs at some sinuses of the lamina is much more matted and denser than in *L. microsora* where a few hairs sometimes occur at the sinuses. Although the main and secondary rhachises in *L. calantha* are comparatively glabrous, there is always a dense mat of almost woolly hairs with dark red septa at the junctions of these rhachises. These hairs are less woolly in *L. microsora*, also the lower surface of all the rhachises is densely pubescent in the latter species. The margin of the ultimate laminal segments is less sharply spinulose-dentate than in *L. microsora* or sometimes it is obliquely crenate.

31. Lastreopsis pacifica *Tindale* sp. nov.

Rhizoma breviter repens, 1-1·5 cm. crassum, paleis fugacibus atrobrunneis, acuminatis, obscuris, margine pilis paucis brevibus vestitis, lanceolatis, lumine aureo-brunneo sparse ornatum. Stipites approximati, 35-50 cm. longi, medium versus 2-2·5 mm. lati, obscuri vel leviter nitidi, laeves vel fere laeves, supra sulcati, subtus glabri vel pilis Ctenitidoideis paucis, sparsis vestiti. Rhachis primaria angustissime alata, pallide rufo-brunnea, ochroleuca vel straminea, obscura vel leviter nitida, latissime sed non profunde canaliculata, marginibus pinnularum ultimarum ut duabus lineis elevatis in rhachidibus et rhachillis superne decurrentibus, parte elevata pilis Ctenitidoideis 2-cellularibus, articulatis dense vestita, subtus pilis talibus fugacibus, 2-cellularibus, rufis ornata; sine gemmis. Frondes usque 60-70 cm. longae. Lamina 30-40 cm. longa, 15-30 cm. lata, tripinnatifido-pinnata vel fere quadripinnata, nisi apicem versus catadromica, atroviridis, subtus pallidior, herbacea, quinquangularis, apice abrupte acuminata, praesertim sinus versus pilis Ctenitidoideis 2-cellularibus vestita, in speciminibus samoensibus fere glabra. Rhachides secundariae subtus pilis Ctenitidoideis rigidis, rufis, 2- vel 3-cellularibus aequaliter cum paleis paucis plus minusve ovatis, denticulatis, pallide brunneis vel atrobrunneis dense vel sparse vestitae, supra ad partem elevatam pilis Ctenitidoideis 2- vel 3-cellularibus, obtusis dense ornatae. Segmenta ultima vel lobulae late rotundatae; margines spinuloso-dentati, basiscopice incrassati. Venae liberae, simplices, furcatae vel in lobulis infimis subpinnatae, valde obliquae, prominentes. Costae subtus pilis Ctenitidoideis 2- vel 3-cellularibus, rigidis praesertim basin versus dense vestitae, sed costulae et venulae minores pilis paucis similibus ornatae; costae et costulae supra pilis Ctenitidoideis appressis, 2- vel 3-cellularibus, brunneis vel rufis dense vestitae, sed venulae minores fere glabrae. Sori mediales, orbiculares, 0·5-0·8 mm. lati, supra furcam venularum vel ad venulas simplices medialiter vel supramedialiter positi. Indusium 0·4-0·8 mm. diametro, rotundato-reniforme, tenue, subpersistens, atrobrunneum, glabrum, integrum vel fere integrum. Sporae bilaterales, globoso-ellipsoidales, atrobrunneae, ruguloso-saccatae. Pili glandulosi oblongi, appressi, unicellulares, aurantiaci, rhachides, costas, costulas et laminam in utraque pagina dense vel sparse vestientes.

Habitat terrestrial in tropical rainforests, often along creek banks. *Rhizome* creeping, 1 to 1·5 cm. thick, similar to that of *L. decomposita*, sparsely clothed with scales which are fugacious, dark brown, acuminate, dull, with a few, short, marginal processes, 0·3 to 0·5 cm. long, 0·5 to 1 mm. broad, lanceolate (3: 1), the lumina golden-brown. *Stipes* closely spaced, at intervals of 0·3 to 1 cm. apart, 35 to 50 cm.

long, 2 to 2·5 mm. broad at the middle, reddish brown, dark brown or dark red-brown at the base, not winged, dull or slightly glossy, smooth or almost so, grooved above, the lower surface glabrous or with a few, scattered *Ctenitis*-hairs. *Main rhachis* very narrowly winged by the decurrent bases of the pinnae towards the apex and middle of the lamina, light red-brown, fawn or stramineous, the lower surface dull or slightly glossy, clothed on both surfaces with fugacious 2-celled, reddish *Ctenitis*-hairs; gemmiferous bulbils absent. *Fronds* including the stipes usually 60 to 70 cm. long. *Lamina* 30 to 40 cm. long, 15 to 30 cm. broad, 3-pinnate-pinnatifid to almost 4-pinnate, catadromous at the base, anadromous towards the apexes of the primary pinnae, dark green, paler on the lower surface, herbaceous, quinquangular, the apex abruptly acuminate, the upper and lower surfaces bearing few to numerous, orange, oblong, glandular hairs as well as 2-celled *Ctenitis*-hairs especially at the sinuses but almost glabrous in the Samoan specimens. *Primary pinnae* 9 to 15 pairs, the petiolules up to 2·5 cm. long, wingless in the lower pairs, overlapping, the lowest pair much enlarged and basiscopically produced, 12 to 30 cm. long and 5 to 14 cm. broad, the apex acuminate to caudate, crenately lobed as in *L. shepherdii*. *Secondary rhachises* sparsely to densely clothed on the lower surface with stiff, reddish, 2- to 3-celled *Ctenitis*-hairs as well as a few, more or less ovate, denticulate, light to dark brown scales, the upper surface densely clothed on the raised portion with 2- to 3-celled, obtuse, usually red-tipped *Ctenitis*-hairs. *Secondary pinnae* with petiolules 2 to 5 mm. long, wingless in the lowest pair, 11- to 14-jugate, oblique, fairly closely spaced, the lowest pair usually 10 to 18 cm. long, 3 to 5·5 cm. broad, obliquely lanceolate (3: 1) to narrowly ovate (2: 1), the apex acuminate. *Tertiary pinnae* with winged petiolules, 3- to 7-jugate, the largest pair 2·3 to 3·2 cm. long, 1 to 2 cm. broad, obliquely lanceolate (3: 1) to broadly ovate (6: 5), the apex acute to broadly rounded, dissected half-way to the midrib or sometimes into pinnae. *Ultimate segments* or lobes broadly rounded, the margin spinulose-dentate, the lower edge much thickened. *Veins* free, simple or forked or subpinnate in the ultimate lobes, not reaching the margin, distant, very oblique, prominent, the lower surface of the costae densely clothed with 2- to 3-celled, stiff *Ctenitis*-hairs especially near the base, the costules and minor veinlets with a few similar hairs, the upper surface of the costae and costules densely clothed with appressed, 2- to 3-celled, brownish or reddish *Ctenitis*-hairs but the minor veinlets almost glabrous. *Sori* indusiate, medial, orbicular, 0·5 to 0·8 mm. in diam., borne on the acroscopic branchlet of the forked veinlets, otherwise medial or supramedial on the simple veinlets. *Indusium* 0·4 to 0·8 mm. in diam., orbicular-reniform with a closed sinus, thin, subpersistent, dark brown, glabrous, entire or almost so. *Sporangia* with a long narrow pedicel bearing a stalked, oblong, orange gland, the annulus composed of 12 to 13 indurated cells and 7 to 8 thin-walled cells including a lateral stomium. *Spores* bilateral, monolete, globose-ellipsoidal, dark brown, ruguloso-saccate, equat. diam. 37·5 to 45 μ × polar diam. 26·25 to 30 μ including the wing which is 3·75 to 7·5 μ in diam. *Glandular hairs* oblong, appressed, unicellular, orange, densely to sparsely scattered along both surfaces of the rhachises, costae, costules and lamina. (Plate XXIII).

DISTRIBUTION: Society Islands, Cook Islands and Samoa.

HOLOTYPE: Society Islands, Tahiti, Fare, Diadem Camp, piti, creek bank, clay loam and rocks, 2,665 ft. alt., common, M.L. Grant No. 3541, 12.5.1930 (UC 437996), located in the Botany Dept., University of California, Berkeley, U.S.A. ISOTYPES: BISH; US 1576622, both examined.

SPECIMENS EXAMINED:—*Cook Islands:* Rarotonga, Wilder No. 1016, 1929 (UC 400194); Rarotonga, Avana Stream, along banks, alt. 900 ft., erect fern 1½ to 2½ ft. high, Wilder No. 1092, 7.1929 (BISH); Rarotonga, Cheeseman 1899 (AK).

Samoa: Island of Savaii, above Salailua, in wet forest, alt. 1,400 ± m., terrestrial herb, Christophersen No. 3099, 11.1931 (US 1919611; BM; BISH).

L. pacifica is closely allied to an Eastern Australian species, *L. decomposita* (R. Br.) Tindale which has a very similar rhizome with closely spaced stipes. In fact Christensen referred the Samoan material of *L. pacifica* collected by E. Christophersen No. 3099 to *Dryopteris decomposita* in B.P. Bish. Mus. Bull. No. 177 (1943) 97. However the apexes of the ultimate segments in *L. pacifica* are broadly rounded and spinulose-dentate, whereas in *L. decomposita* they are apiculate, mucronate or acuminate, also the margin of the ultimate segments is entire or serrulate. Nevertheless the laminal margin in *L. microsora* (Endl.) Tindale is somewhat similar to that of *L. pacifica* but is more sharply spinulose-dentate in the former species. *L. microsora* is characterized by a much narrower and very long-creeping rhizome, also the vestiture of the axes is different. The hairs on the lower surface of the secondary rhachises in *L. microsora* are much longer being 4- to 9- celled, acute and whitish instead of 2- or 3-celled, obtuse and reddish or brownish as in *L. pacifica.*

32. Lastreopsis microsora (*Endl.*) *Tindale* in Vict. Nat. LXXIII (1957) 181; Tindale in Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 73, pl. IX, f. 1 and 3; J. H. Willis, Handb. Pl. Vict. I (1963) 40 .

Key to the Subspecies

1. Basal tertiary segment of the acroscopic secondary pinnae usually 1·3 to 2 cm. long .. .. ssp. *microsora* a.

1.* Basal tertiary segment of the acroscopic secondary pinnae usually 0·7 to 1·4 (rarely up to 2) cm. long .. .. ssp. *pentangularis* b.

a. L. microsora (*Endl.*) *Tindale* ssp. **microsora.**

Habitat terrestrial in the drier subtropical rainforests, also sometimes in temperate rainforests. *Rhizome* long-creeping, often branched, narrow i.e. 1·5 to 7 mm. broad, clothed with scales which are very fugacious, dark brown, thin, dull or slightly glossy, narrowly lanceolate (6: 1) to narrowly ovate (2: 1), usually 1 to 4 mm. long and 0·5 to 1·5 mm. broad, the cells hexagonal to rectangular, thick-walled with dark red or yellowish-brown lumina, the margin rarely with dark red or brown, glandular-headed hairs but fimbriae are common, the apex acute or acuminate in large scales but often terminating in a *Ctenitis*-hair in small scales. *Stipes* at intervals of 0·3 to 3 cm. along the rhizome, 10 to 50 (usually 30 to 45) cm. long, 3 to 4·5 mm. broad near the middle, fawn to light brown, brown, often dark red-brown at the base, not winged, dull or sublustrous, pubescent on the lower surface, scabrous especially near the base, with 2 prominent ridges on the upper surface, densely tomentose in the broad shallow channel with matted, fawn, acute or obtuse *Ctenitis*-hairs of 3 to 5 cells with red-brown articulations; bases of the stipes clothed with paleae which are dark brown or black, obtuse, acute or acuminate, sublustrous, thin, slightly fimbriate near the apex, narrowly lanceolate (6: 1) to lanceolate (3: 1), 1 to 4 mm. long and 0·5 to 1·5 mm. broad. *Main rhachis* not winged except at the apex, dull, smooth, densely pubescent on the lower surface, fawn or light brown; 2 prominent ridges on the upper surface, densely tomentose on the raised median band and shallow channel between them, also clothed with scattered, dark brown, more or less ovate, sublustrous scales which also occur on the secondary rhachises; gemmiferous bulbils absent. *Fronds* including the stipes 30 to 90 cm. long. *Lamina* 18 to 50 cm. long, 12 to 47 cm. broad, 3-pinnate to 4-pinnate but mostly 3-pinnate-pinnatifid, catadromous below, anadromous above, pale green when fresh, the upper surface darker, submembranous to herbaceous, not as rigid as in *L. decomposita*, dull on both surfaces, quinquangular (3: 2 to 6: 6) or broader than long; abaxial surface glabrous or slightly to very densely villous, often velvety; apex acuminate. *Primary pinnae* stalked, the lower petiolules not winged; lowest pair usually opposite or sometimes all the pinnae opposite, closely spaced and often imbricate, erecto-patent, 12 to 40 cm. long, 9 to 20 cm. broad, obliquely narrowly lanceolate (6: 1) to narrowly ovate (2: 1), the basal pair the largest, their lower sides considerably produced, the apex acuminate. *Secondary pinnae* with the lower petiolules narrowly winged, the basiscopic secondary pinnae of all the primary pinnae except the lowest pair much smaller than the corresponding acroscopic secondary pinnae; basiscopic secondary pinna of the basal primary pinnae nearest to the main rhachis narrowly lanceolate (6: 1) to narrowly ovate (2: 1) and much enlarged, i.e. 5 to 20 cm. long and 1·5 to 5·5 cm. broad, the others narrowly lanceolate-cultrate (6: 1) to narrowly ovate-oblong (2: 1), unequal-sided, the anterior side considerably larger. *Tertiary pinnae* stalked, with winged petiolules, alternate, closely spaced, not imbricate, erecto-patent, narrowly ovate-oblong (2: 1) to narrowly oblong-lanceolate (3: 1) or narrowly oblong (3: 1) to oblong (2: 1); apex obtuse or broadly rounded; base decurrent on the costae. *Ultimate segments* sessile, opposite or alternate, closely spaced, erecto-patent, more or less broadly elliptical or oblong, the apex obtuse or broadly rounded, the margin and apex thickened and rather sharply spinulose-dentate, the base oblique and unequally-sided. *Veins* free, not reaching the margin, those of the secondary and tertiary pinnae catadromous in the lower and/or middle segments but anadromous towards the apex, sometimes all anadromous except the basal pair, the minor veinlets from the midnerve simple, forked or pinnate; costae, costules and minor veinlets very densely clothed on both surfaces with long, soft, spreading, white or fawn hairs (6 to 7 cells in length) or short hairs (3 to 5 cells in length), otherwise the costules and minor veinlets almost or quite glabrous. *Sori* indusiate, superficial, very nearly marginal or half-way between the margin and midrib, mostly 1 to 6 on each ultimate segment, usually medial on the minor veinlets or almost terminal on the branches of the minor veinlets. *Indusium* orbicular-reniform, fawn, usually with a red-brown centre, membranous, persistent, 0·5 to 1·5 mm. in diam., glabrous or slightly hairy, clothed with a few, long, hyaline hairs of about 6 to 7 cells in the more hirsute forms of this species; margin often slightly and irregularly toothed. *Sporangia* with an annulus composed of 12 to 15 indurated cells and about 6 to 8 thin-walled cells including a lateral stomium, the pedicel 3 to 7 cells long, rarely with stalked glandular hairs. *Spores* globose-ellipsoidal, bilateral, monolete, with a crested perispore, equat. diam. 26·25 to 35·63 μ × polar diam. 22·5 to 26·25 μ, the wing often dissected, 3·75 to 5·63 μ. in diam. *Glandular hairs* oblong, appressed, unicellular, red, orange or yellow, usually scattered along both surfaces of the main rhachis, costae, costules and minor veinlets, the surface of the lamina and the indusium (especially towards the centre). (Plate IX, 1, 3).

DISTRIBUTION: Australia (Coast and Tablelands from north-eastern Queensland to East Gippsland, Victoria).

ISOLECTOTYPE: Herb. Lugd. Bat. No. 908,335-846, labelled " *Aspidium microsorum* Kaulf. in Sieber Syn. Fil. No. 101, Nova Hollandia ". This specimen which I examined in the Rijksherbarium, Leiden, is a rather glabrous form of this species.

SPECIMENS EXAMINED:—In the following specimens the laminas are almost glabrous:—

Queensland: Proserpine, Michael No. 1424 (BRI); South Kennedy district, Eungella Range, Dalrymple Heights, Clemens 7.1947 (BRI); Booloumba Creek, Little Yabba Forest Reserve, fronds rather distant, up to 18 inches long, pale green and thin in texture, fairly common in rainforest fringing creek, Goy & Smith No. 652, 4.1939 (BRI); Main Range, SE Queensland, alt. about 2,800 ft. in rainforest, intermixed with *Athyrium australe*, Goy & Smith No. 484, 6.1938 (BRI); Brisbane River, Fraser No. 169, 1829 (Herb. Hook., K); Moreton District, Upper Cedar Creek, near Mt. Glorious, fronds pale green, rhizome long-creeping, Smith 1940 (BRI); about 1 mile NW of Mt. Glorious, along a track in rainforest, about 2,000 ft. alt., Smith & Tindale 8.1956 (NSW P7432); near Mt. Nebo, about ½ mile W of the junction of the road from Samford with the road to Mt. Glorious, near a creek in rainforest, alt. 1,400 ft., Smith & Tindale 8.1956

(NSW P7435); Spicer's Gap, E. J. Smith No. 738, 3.1938 (BRI); Numinbah Valley, near Natural Bridge, common in rainforest, near the creek, fronds 2 to 5 ft. high, alt. 900 ft., Goy & Smith No. 537, 10.1938 (BRI); Rathdowney, Boorman 8.1916 (NSW P5109); Lamington National Park, Tooloona Creek, in rainforest, terrestrial fern, ca. 2,500 ft. alt., Smith & Tindale 8.1956 (NSW P7451); Lamington National Park, in rainforest, 3,000 to 3,700 ft. alt., fronds more or less distant, pale green, stipes erect, lamina oblique, Blake No. 12992, 5.1937 (BRI); Springbrook, alt. 2,500 ft., on track bordering the rainforest, Goy & Smith No. 205, 1.1938 (BRI); Mt. Ballow, alt. 3,500 ft., associated with *L. decomposita* but not nearly as common, White No. 11111, 7.1937 (BRI).

New South Wales: Acacia Plateau, in rainforest gully, red basalt, Constable 5.1947 (NSW P4871); Wiangarie State Forest, ca. NE of Kyogle, 2,000 ft. alt., very common on hillside, Constable 1.1953 (NSW P6323; K; US; MO; UC; L); Dunoon, Richmond River, Fletcher 4.1890 (NSW P4491); Bulgong Heights, Watts 5.1916 (NSW P4506); Upper William's River, Fraser & Vickery 11.1936 (NSW P4486; SING); Nabiac, via Taree, in rainforest, Gilbert 7.1947 (NSW P220-1); Dyer's Crossing, via Taree, in rainforest, Gilbert 7.1946 (NSW P568); Gosford, Deane 10.1888 (NSW P4503); Mt. Irvine, alt. 2,500 ft., Constable 3.1950 (NSW P6265); ditto, Haigh 8.1942 (NSW P75); Cathedral of Ferns, Mt. Wilson, rainforest, basalt hillside, Tindale & Constable 3.1952 (NSW P2041; BM; UC; US); Happy Valley, Mt. Wilson, erect fern 2 to 3 ft. high in rainforest, basalt, volcanic loam, Constable 12.1948 (NSW P2072; BM; MO; U); Bola Creek, National Park, in rainforest, in stands under trees, Tindale & Constable, 10.1952 (NSW P6976; L; MEL; SING; K; US; MO; UC; BO); Minnamurra Falls, about 3 miles W of Jamberoo, in rainforest, Melville & Tindale 4.1953 (NSW P6394); ditto, Lovis & Tindale 8.1955 (NSW P7185); Conjola, Heron 11.1898 (NSW P4497).

**Victoria:* Mt. Drummer, East Gippsland, Wakefield No. 2, 9.1939 (BRI).

In the following specimens the laminas are villous or very pubescent:—

Queensland: Cook district, between Cairns and Herberton, Wild 1891 (BRI); Allumbah, Herberton district, Waller 10.1909 (NSW P4676); near the Evelyn Highway, approx. 2,000 ft. alt., in deep basalt soil, in rainforest, Messmer 9.1954 (NSW P6977); Tambourine Mountain, ca. 580 m., Posthumus No. 3867, 8.1935 (BO 102262); Burleigh Heads, Moreton District, Young & White 12.1917 (NSW P4619; BRI); Burleigh, Young 12.1915 (NSW P4675; BRI).

New South Wales: Burringbar, near Tweed River, Betche 4.1896 (NSW P4615, P1533; SING); Tweed River, Bäuerlen No. 961, 1893 (NSW P4617); Richmond River, Watts (NSW P23, P57, P6165); Tintenbar, Richmond River, Watts 1901 (NSW P5400); off Doyle's River Road, from Oxley's Highway, about 48 miles W of Wauchope, ground cover in tall rainforest, Garden 10.1951 (NSW P2863; US; BO); gully from Bulga Cutting, via Manning River, Watts 4.1915 (NSW P4504); Bulga Scrub, Watts 4.1915 (NSW P4488, P4489); Dyer's Crossing, via Taree, Gilbert 5.1948 (NSW P5390; K; US); Mt. Irvine, basalt valley, Haigh 8.1942 (NSW P187).

Absolute Synonyms: *Nephrodium microsorum* Endl., Prodr. Fl. Norflk. (1833) 9; *Lastrea microsora* (Endl.) Presl, Tent. Pterid. (1836) 76.

Equivalent Synonyms: *Aspidium quinquangulare* Kze. in Linnaea XXIII (1850) 302, Lectotype: Herb. Lugd. Bat. No. 908, 335 . . . 852, labelled "*Asp. quinquangulare* Kze. (*A. aemulum* Belg.) Patria? H. Van Houtte, H. Lips. 1843". Unfortunately this small specimen lacks a rhizome. The apices of the ultimate segments are more rounded than in most specimens of *L. microsora.* Dark brown, ovate scales are very numerous amongst the short, fawn hairs of the tomentum on the stipes; *Lastrea quinquangularis* (Kze.) J. Sm., Cat. Cult. Ferns (1857) 57 (in the text as *quinquangulare* which is an orthographical error), supposedly a native of West Africa; *Aspidium decompositum* (R. Br.) Spreng. var. *quinquangulare* (Kze.) Mett. in Fil. Hort. Bot. Lips. (1856) 94; *Aspidium acuminatum* Lowe var. *villosum* F. M. Bail. in Rep. Gov. Sci. Exped. Bellenden-Ker (1889) 78, Holotype: Top Camp (Bellenden-Ker), Queensland, F. M. Bailey (BRI) and Isotype (BM); *Dryopteris baileyana* Domin in Bibl. Bot. LXXXV (1913) 37, Holotype, the same as for *A. acuminatum* var. *villosum; Dryopteris albovillosa* W. W. Watts in Proc. Linn. Soc. N.S.W. XXXIX, 1914 (1915) 771, Holotype: Stoney Creek, near Cairns, NE Queensland, W. W. Watts 7.1913 (NSW P4678).

Unfortunately the type of *Nephrodium fraseranum* Gaud., in Freyc. Voy. Bot. (1827) 339, cannot be found according to Mme. Tardieu-Blot who very kindly searched for it in the Muséum National d'Histoire Naturelle, Paris. The holotype was collected by Fraser at Port Jackson, New South Wales but this locality denoted a wide area at that date. From Gaudichaud's description *N. fraseranum* might be a rather glabrous form of *L. microsora* but it could also be *L. munita* or another of the more glabrous species of this group.

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* According to J. H. Willis in Handb. Pl. Vict. I (1962) 40, this species is also recorded from Karlo Creek, Mallacoota Inlet and Howe Ranges in Victoria.

As I pointed out in Vict. Nat. LXXIII (1957) 182, two different species were grouped together by Endlicher under his *Nephrodium microsorum* in Prodr. Fl. Norflk. As he specifically referred to "Sieber's Syn. Fil. No.101, *Aspidium microsorum*" nomen nudum, it was preferred to select this specimen which was collected in Australia, as the lectotype of *N. microsorum*. The other specimen, to which Endlicher referred, was collected by F. Bauer in Norfolk Island and is now located in the Natural History Museum, Vienna. The latter material is identical with *Lastreopsis calantha* (Endl.) Tindale which appears to be endemic on Norfolk Island. I have not seen any material similar to Sieber's Syn. Fil. No. 101 except from the mainland of Australia. Endlicher's description of *N. microsorum* fits the Australian material better than that of Bauer's specimen from Norfolk Island, especially as he described the rhachis and costae as puberulous. The Norfolk Island material is characterized by glabrous costae.

A chromosome count of $n = 41$ (diploid) was made on material of *L. microsora* by Prof. I. Manton (see Contrib. N.S.W. Nat. Herb., Fl. N.S.W. No. 211 (1961) 76). This specimen was collected at Minnamurra Falls, N.S.W., by R. Melville No. 3799 and M. Tindale (K).

I have not described the forms of *L. microsora* with villous or very pubescent laminas as a subspecies, because I have not been able to associate the degree of pubescence on the lower surface of the fronds with any other distinguishing character. Also there are too many intermediates and the length of the hairs differs too much in the hirsute specimens e.g. it is difficult to ascertain into which group NSW P568 and P5390 should be placed. Admittedly the villous specimens are more common in north-eastern Australia and in the Burleigh Heads district of south-eastern Queensland, whereas the almost glabrous forms occur chiefly in the southern portion of its range, especially in New South Wales and eastern Victoria i.e. there is a north-south cline in this species. The colour of the oblong glands on the lamina does not correspond with the degree of pubescence, i.e. red, orange and yellow glands occur on the densely villous fronds as well as on the almost glabrous ones.

This species has been much confused with *Lastreopsis decomposita*, since the laminas are superficially rather alike, although they are more flaccid in *L. microsora*. The margin and apexes of the ultimate segments in the latter are spinulose-dentate, whereas in *L. decomposita* the margin is slightly serrulate or entire and the apexes are acuminate, mucronate or apiculate. The chief point of difference between the two species lies in the rhizome which is thick and shortly creeping in *L. decomposita* but narrow and widely creeping in *L. microsora*. Both species are common in the rainforests of New South Wales and south-eastern Queensland, although *L. microsora* extends to north-eastern Queensland. The lower surface of the stipes is always minutely tomentose in *L. microsora*, although a number of these hairs often rub off. The lower surface of the stipes is never quite glabrous as in some forms of *L. decomposita*.

b. L. microsora (*Endl.*) *Tindale* ssp. **pentangularis** (*Col.*) *Tindale* **comb. et. stat. nov.** BASIONYM: *Nephrodium pentangularum* Colenso in Tasm. Journ. II (1846) 169, an orthographic error for *pentangulare*.

The fronds of *L. microsora* ssp. *pentangularis**, which is native to New Zealand, are usually smaller than in the Australian subspecies i.e. ssp. *microsora*, being mostly 15 to 35 cm. long and 11·5 to 23 cm. broad. The margin of the ultimate segments

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* Since the publication of my remarks in Contrib. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961) 76, I have examined a great deal more material of *L. microsora* from New Zealand. It is possible that some of this material may be diploid.

of the lamina is more sharply spinulose-dentate than in ssp. *microsora*. However, some specimens of ssp. *pentangularis* are almost indistinguishable from Australian material of ssp. *microsora* e.g. Lovis N.Z. No. 351, and D.S.I.R. No. 22970, whereas others, e.g. US 417908 and US 68944 have much smaller, narrower segments of the lamina than the Australian specimens. In US 816510 from Orakei, New Zealand, collected by Cheeseman in December 1883, the basal tertiary segments of the acroscopic secondary pinnae are larger than is usual, being up to 2 cm. long. This specimen has a large frond which is 36 cm. long and 23 cm. broad but the ultimate segments are very narrow.

In New Zealand *L. microsora* ssp. *pentangularis* occurs in lowland to montane forest including tawa-podocarp forest.

NSW P8054 collected at Whangaroa North by Petrie in May 1897 is quite a good match for the isotype of *Aspidium pentangularum* Colenso at the Kew Herbarium (i.e. *Nephrodium pentangulare* Colenso).

Distribution: New Zealand (North and South Islands).

Syntypes: East Coast, New Zealand, W. Colenso 1841 (not seen); Bay of Islands, New Zealand, W. Colenso 1837 (not seen); Isotype (K), examined.

Specimens Examined:—*New Zealand:* Whangaroa North, Auckland Peninsula, Eastern side, Petrie 5.1897 (NSW P8054); Waikowhai Park, Auckland, Hynes 12.1952 (NSW P8052; AK 31439); Orakei, Cheeseman 12.1883 (US 68944 and 816510); Puponga, Kirk (US 816511); Wairarapa, Dobbie 8.1930 (NSW P8051); Tauwharenikau Racecourse, Wairarapa, Mason 11.1939 (D.S.I.R. No. 22970; CHR); Thames Goldfields, 100 ft. alt., Brame 6.1922 (US 1371824); New Plymouth, partial shade, dry clay bank, Rawson 12.1945 (D.S.I.R. No. 71183; CHR); Kitchener Park, Fielding, Manawatu, in tawa-podocarp forest, Healy 9.1934 (D.S.I.R. No. 33671; CHR); between Pukarua Bay and Plimmerton, remnant bush, Harris 2.1948 (NSW P8053); Wellington, Logan 5.1867 (K); Pakairatahi (on the road from Upper Hutt to Featherston, in the Rimutaka Range, Wellington Province), Kirk (US 816512); vicinity of Dunedin, Armstrong 1887-8 (US 417908). Without specific localities:— Kirk, received 7.1877 (K); J. D. Hooker (K); Logan 11.1865 (K).

Absolute Synonyms: *Nephrodium pentangularum* Colenso in Tasm. Journ. II (1846) 169 (orthographic error for *pentangulare*); *Ctenitis pentangularis* (Col.) Alston in Amer. Fern Journ. XLV (1955) 160.

In New Zealand this somewhat borderline subspecies has been misdetermined as *Dryopteris decomposita* (R. Br.) O. Ktze. in Cheeseman, Man. N.Z. Fl. (1925) 33, and as *Ctenitis decomposita* (R. Br.) Copel. in Dobbie & Crookes, N.Z. Ferns (1952) 250, photo 251; Harris in D.S.I.R. Bull. No. 116 (1955) 44, pl. 9, f. 11 and 132; Allan, Fl. N.Z. I (1961) 90. The differences between *L. decomposita* and *L. microsora* have been explained in detail on page 334.

A chromosome count of $n = 82$ was recorded for *L. microsora* ssp. *pentangularis* (as *Ctenitis decomposita*) by Brownlie in Trans. Roy. Soc. N.Z., Bot. I (1961) 2, on material from New Plymouth, New Zealand.

33. Lastreopsis nephrodioides (*Bak.*) *Tindale* in Vict. Nat. LXXIII (1957) 184.

Habitat terrestrial in valleys and on mountainsides in tropical rainforests. *Rhizome* apparently long-creeping, about 8 mm. in diam., bearing strong roots, clothed with scales which are very dark brown, hair-pointed, twisted, thin to thick and chitinous, entire or slightly denticulate, glossy, linear (12: 1), 1 to 2 cm. long, 0·8 to 1·5 mm. broad, the lumina dark brown. *Stipes* usually 20 to 30 cm. in length, 1·5 to 4 mm. broad near the middle, fawn, light brown or light castaneous, dark brown towards the base, not winged, dull or slightly glossy, smooth or almost so towards the apex and middle, very scabrous with projections near the base, grooved above, tomentose in the channel towards the apex, the lower surface clothed especially near the base and apex with 2- to 5-celled, lax or erect *Ctenitis*-hairs, sometimes glabrescent, clothed near the base with similar scales to those on the rhizome but borne on eminences. *Main rhachis* winged towards the apex, light brown, light chestnut-coloured or fawn, dull, smooth, almost glabrous except near the edges where a number of 2- or 3-celled *Ctenitis*-hairs occur, the upper surface with 2 ridges, the raised portion and the channel densely tomentose with obtuse, 2- to 5-celled *Ctenitis*-hairs; not gemmiferous with scaly bulbils. *Fronds* including the stipes up to 90 cm. in length. *Lamina* 25 to 60 cm. long, 15 to 45 cm. broad, 4-pinnate to 4-pinnate-pinnatifid, almost 5-pinnate in large fronds, catadromous only at the base of the lamina, otherwise anadromous, dark green above, much paler beneath, herbaceous to thinly subcoriaceous, quinquangular, glabrous between the veins except for glandular hairs, a tuft of obtuse, 3- to 5-celled *Ctenitis*-hairs at the sinuses, as well as at the base of each costa, costule etc. and in the axils between their junction with another axis or vein, the apex acute to shortly acuminate. *Primary pinnae* about 6 to 9 pairs, the petiolules up to 5·5 cm. long, wingless except towards the apex of the lamina, widely spaced to overlapping, oblique, often upcurved, the lowest pair much enlarged and basiscopically produced, 8 to 30 cm. long, 5 to 22 cm. broad, obliquely ovate-deltoid (3: 2) to broadly ovate-deltoid (6: 5), the apex shortly acuminate or acute. *Secondary rhachises* similar to the main rhachis. *Secondary pinnae* 9- to 14-jugate, the petiolules not winged except near the base of the secondary pinnae, the lowest pair much enlarged, 6·5 to 18 cm. long, 4 to 9·5 cm. broad, obliquely narrowly ovate (2: 1) to ovate (3: 2), the apex shortly acuminate to acute. *Tertiary segments* with winged petiolules except in the lowest pair, 7- to 12-jugate in the largest segments, obliquely lanceolate (3: 1) to narrowly ovate (2: 1), the largest pair up to 7 cm. long and 3 cm. broad, the apex apiculate, acute to subacute. *Quaternary segments* with a stalked petiolule or mostly sessile, more or less broadly oblong or in larger fronds obliquely narrowly ovate (2: 1) or lanceolate (3: 1), the apex obtuse, the lower margin much thickened, the margin with a few, rather blunt teeth. *Veins* simple, forked or pinnate in the ultimate segments, very prominent on the upper surface, not reaching the margin, the lower surface of the axes, costae and costules sparsely clothed with fugacious, 2- or 3-celled, stiffly spreading *Ctenitis*-hairs, the minor veinlets glabrous or almost so on both surfaces, the upper surface of the axes, costae, costules etc. densely tomentose with *Ctenitis*-hairs similar to those on the secondary rhachises. *Sori* indusiate, medial to marginal, sometimes borne on short marginal projections, orbicular, ca. 0·5 to 1 mm. in diam., terminal on simple veinlets or on the acroscopic branch of forked veinlets. *Indusium* 0·8 to 1 mm. in diam., orbicular-reniform, with a closed sinus, very persistent, thin, firm, brown, sometimes with a black centre, almost clathrate, devoid of septate or glandular hairs, the margin entire or crenulate. *Sporangia* with a long narrow pedicel often bearing a stalked, yellow, more rarely orange, oblong gland, the annulus composed of 12 to 15 indurated cells and about 6 to 8 thin-walled cells. *Spores* bilateral, monolete, globose-ellipsoidal, dark brown to almost black, ruguloso-saccate, equat. diam. 33·75 to 39·38 μ × polar diam. 26·25 to 33·75 μ including the rounded projections which are up to 7·5 μ in diam. *Glandular hairs* oblong, appressed, yellow or orange, scattered densely to sparsely along the rhachises, costae, costules and minor veinlets on both surfaces, usually very densely clothing the stipes. (Plate XI, f. 3-4).

DISTRIBUTION: Lord Howe Island (New South Wales).

HOLOTYPE: Lord Howe Island, W. Carron (under the direction of C. Moore), 1871 or 1872. No type specimen was cited by Baker but according to his statement in the Gard. Chron. (1872) 113, this species was described from material collected by Carron.

SPECIMENS EXAMINED:—*Lord Howe Island: Specimens with marginal sori:* Eastern slope of Mt. Lidgbird, alt. ca. 1,000 ft., in dryish rocky woodland, growing below a large rock but surrounding " soil " churned up by wild pigs, fronds 4 ft. long, Green No. 1689, 11.1963 (NSW

P8562); E side of Mt. Lidgbird, Howe's Island No. 11 (K); SE side of Mt. Lidgbird, Beauglehole No. 5405, 11.1962 (MEL); between Goat House and Boat Harbour, Beauglehole No. 5743, 9.1963 (MEL); sine loc., Maiden 4.1898 (NSW P7513) and (WELT P3175). *Specimens with median to almost marginal sori:* Northern side of Mt. Lidgbird, Beauglehole No. 5406, 11.1962 (MEL); ditto, Beauglehole No. 5396, 11.1962 (MEL); Erskine Valley, along watercourse, on N side of main stream, E of " Citrus Camp ", Beauglehole No. 5741, 9.1963 (MEL); saddle towards the top of Mt. Gower, amongst shaded rocks, Beauglehole No. 5742, 9.1963 (MEL); summit of Mt. Gower, southern side of lower end of first or northernmost creek, on moist shaded bank in cloud forest on summit plateau, alt. ca. 2,800 ft., Green No. 1652, 11.1963 (NSW P8563); slopes of Mt. Gower, Watts 8.1911 (NSW P7512); summit of Mt. Gower, undergrowth in moss forest, Oliver 11.1913 (WELT P3173); Erskine Valley, Oliver 1913 (NSW P7510); ditto, on bank of stream in forest, Oliver 11.1913 (WELT P3174); sine loc., King 2.1892 (NSW P7511); sine loc., Kirk 2.1892 (WELT P3172).

ABSOLUTE SYNONYMS: *Deparia nephrodioides* Bak. in Gard. Chron. (1872) 253; Hook., Ic. Pl. (1886) t. 1608; *Davallia nephrodioides* (Bak.) F. Muell., Fragm. X (1877) 104; *Dicksonia nephrodioides* (Bak.) F. Muell., Cens. Austr. Pl. I (1882) 137; *Dryopteris decomposita* (R. Br.) O. Ktze. var. *nephrodioides* (Bak.) W. W. Watts in Proc. Linn. Soc. N.S.W. XXXVII (1913) 397; *Dryopteris nephrodioides* (Bak.) Watts in Proc. Linn. Soc. N.S.W. XXXIX (1914) 259, non (Hook.) O. Ktze. (1891) nec (Kl.) Hieron. (1907); *Ctenitis nephrodioides* (Bak.) Ballard in Kew Bull. IV (1954), 1955, 559.

EQUIVALENT SYNONYMS: *Nephrodium apicale* Bak. in Hook. & Bak., Syn. Fil. (1874) 499, HOLOTYPE: side of Mt. Lidgbird, Howe's Isl., C. Moore (K), seen; *Aspidium apicale* (Bak.) Benth., Fl. Austr. VII (1878) 758; *Dryopteris apicalis* (Bak.) O. Ktze., Rev. Gen. Pl. II (1891) 812; *Ctenitis apicalis* (Bak.) Ballard in Kew Bull. IV (1954), 1955, 559.

Deparia nephrodioides Bak. was based on material in which the sori were borne on marginal projections from the lamina. This condition is well illustrated in NSW P7513, P.S. Green No. 1689 and in East Side of Mt. Lidgbird, Howe's Island, No. 11 (K). NSW P1061 which was collected on Mt. Gower, Lord Howe Island, is intermediate between *Lastreopsis nephrodioides* and the form with medial sori known as *Ctenitis apicalis* (Bak.) Ballard. In NSW P1061 the sori are borne very close to the margin of the ultimate segments so that part of the indusium and sorus usually projects beyond the laminal margin. In *C. apicalis* the sori range from medial to almost marginal, but I have been unable to find any other differences between these two " forms ", so that I have hesitated to retain them as distinct species. A careful examination of the spores of a number of specimens did not reveal any constant differences. Both " forms " are characterized by tufts of hairs at the sinuses of the lamina and at the base of each costa, costule and in the axils between their junction with another axis or vein. The scales and hairs on the stipes and rhachises in both " forms " are very similar. It was considered at first that the specimens with marginal sori collected by Maiden were aberrant but similar material was obtained by Beauglehole and Green in 1962 and 1963 respectively.

IMPERFECTLY KNOWN SPECIES

There are also two possibly undescribed species of *Lastreopsis*, one from Africa and the other from the Kermadec Islands. Further material is required to determine the status of both taxa.

Lastreopsis sp. aff. *pacifica*.

I have examined several specimens which appear to be closely related to *Lastreopsis pacifica* but were collected in the Kermadec Islands and probably belong to an undescribed species. The latter specimens have larger, more persistent indusia than in *L. pacifica*, also the tufts of hairs at the sinuses of the lamina (so characteristic of the latter species) are absent in the material from the Kermadec Islands. In *L. pacifica* the indusia are 0·4 to 0·8 mm. in diam., devoid of glandular hairs and subpersistent, whereas in the Kermadec Island material the indusia are 1 to 1·5 mm. in diam., persistent and glabrous or more or less clothed with scattered, orange, glandular hairs. The lamina in *L. pacifica* is 3-pinnate-pinnatifid or almost 4-pinnate, whereas it is 3-pinnate in the Kermadec Island material, but the margin is spinulose-dentate in both cases.

Unfortunately in the Kermadec Island material the rhizome is missing in all the specimens which I have examined. The lower surface of the secondary rhachises are densely clothed with 2- or 3-celled *Ctenitis*-hairs, the costae, costules and minor veinlets being sparsely clothed with similar hairs. Orange or red-brown, oblong, unicellular, appressed, glandular hairs occur on the pedicels of the sporangia as well as on the lower surface but not the upper surface of the costae, costules, minor veinlets and lamina. The sori are medial, orbicular and comparatively large (i.e. 1 to 1·5 mm. in diam.).

Specimens Examined:—*Kermadec Islands:* Sunday Island, Oliver 9.1908 (NSW P7942); ditto, Cheeseman 8.1887 (AK); ditto, upper forest, big hill, Oliver 3.1908 (AK).

Lastreopsis sp. aff. *currori.*

There are several African specimens from Ghana, Liberia, the Ivory Coast and Principe which probably belong to another species of *Lastreopsis*, based on *Aspidium nigritianum* Mett. ex Kuhn, and *Dryopteris tomentella* C. Chr., although I consider that there is insufficient material to make a decision. The dark green fronds are 2-pinnate-pinnatifid to 3-pinnate-pinnatifid, often with scaly proliferous buds near the apices of the main rhachises. In Barter No. 1906 collected at Principe (K), i.e. the holotype of *A. nigritianum*, there are a few submarginal sori with an occasional brown, glabrous, reniform indusium still present. In Box No. 3505A from the Atewa Range, Ghana (BM) there are medial sori with small, brown, reniform-orbicular indusia bearing oblong, glandular hairs on the margin and surface. The secondary rhachises are glabrous or almost so, unlike those of *L. nigritiana* (Bak.) Tindale in which they are villous. The apices of the ultimate laminal segments are more broadly rounded than in *Lastreopsis currori*. In Barter No. 1906 the lamina is almost devoid of yellow, oblong, glandular hairs but in NSW P8533, Box Nos. 2945 and 3505A, yellow and dark orange, oblong, glandular hairs are very numerous on both surfaces of the lamina. The rhizomes in Harley F 175 and Box 3505A are erect to slightly oblique and clothed with dull, dark brown scales.

It is possible that Box No. 3597 which was collected near Loom, Mungo River, Cameroon, ca. 1,200 ft. alt., 2.1944 (BM) may belong here, although it lacks sori, also the secondary pinnae are more acute than in the other specimens listed here. NSW P8533, Harley F 175 and Box 3505A are characterized by whitish hairs which are rather prevalent on the upper surface of the lamina especially towards the margin but they are absent in Box Nos. 2945 and 3597.

Distribution: Ghana, Liberia, Principe, Ivory Coast and probably Cameroon.

Specimens Examined:—*Ghana:* 5 miles NE of Bosuso, East Province, 1,200 ft. alt., in mountain-forest, Box No. 2945, 8.1941 (BM); Atewa Range, Kibi Mountains, East Province, 2,500 ft. alt., on boulders in virgin mountain-forest, Box No. 3505A, 10.1943 (BM).

Principe: Niger Expedition, caudex creeping, Barter No. 1906 (K), examined.

Liberia: Bilimu, by a stream, Harley No. F 175, 12.1949 (BM).

Ivory Coast: Forêt du Téké, in rainforest, A. Bouquet 3.1963 (NSW P8533).

Absolute Synonyms: *Aspidium nigritianum* Mett. ex Kühn, Fil. Afr. (1868) 138; *Nephrodium nigritianum* (Mett. ex Kühn) Bak., Syn. Fil. (1874) 499; *Dryopteri snigritiana* (Mett. ex Kühn) O. Ktze., Rev. Gen. Pl. II (1891) 813; *Ctenitis nigritiana* (Mett. ex Kühn) Alston, Ferns & Fern-Allies West Trop. Africa (1959) 73.

Equivalent Synonym: *Dryopteris tomentella* C. Chr., Ind. Fil. (1905) 298.

ACKNOWLEDGEMENTS

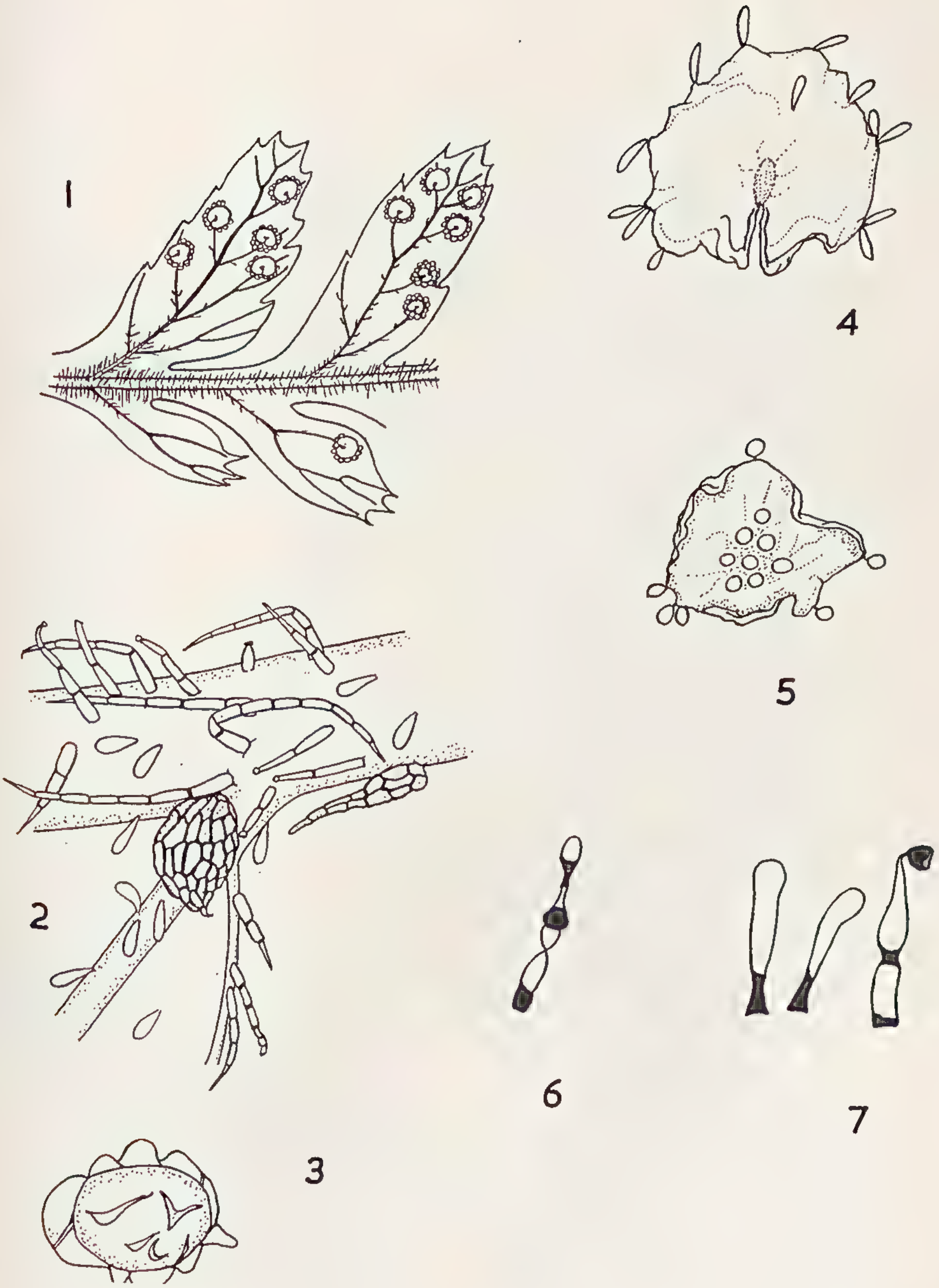
The abbreviations for herbaria are those used by Lanjouw & Stafleu in Index Herbariorum, pt. 1, ed. 4 (1959).

I wish to thank the Directors and Keepers of the following institutions for the loan of specimens of *Lastreopsis:*— Auckland Institute & Museum, Auckland, New Zealand; University of California, Berkeley, California, U.S.A.; Botanisches Museum, Berlin-Dahlem, Germany; Botanic Museum & Herbarium, Brisbane, Queensland; Jardin Botanique de l'État, Brussels, Belgium; The Herbarium, Bogor, Indonesia; Gray Herbarium, Harvard University, Cambridge, U.S.A.; Botany Division, D.S.I.R., Christchurch, New Zealand; University Bot. Museum, Copenhagen, Denmark; B.P. Bishop Museum, Hawaii, U.S.A.; The Herbarium, Kew, England; University of Kyoto, Japan; University of Leeds, England; Rijksherbarium, Leiden, Holland; British Museum of Natural History, London, England; National Herbarium, Melbourne, Victoria; Muséum National d'Histoire, Paris, France; National Museum, Prague, Czechoslovakia; The Herbarium, Botanic Gardens, Singapore; Paleobotanical Dept., Swedish Museum of Natural History, Stockholm, Sweden; Botanical Museum & Herbarium, Utrecht, Holland; Natural History Museum, Vienna, Austria; Laboratory for Plant Taxonomy & Plant Geography, Wageningen, Holland; Smithsonian Institution, Washington D.C., U.S.A.

I should also like to thank the following institutions for donating specimens of *Lastreopsis* to the Royal Botanic Gardens, Sydney:— Missouri Botanical Garden, St. Louis, Mo., U.S.A.; Jardim Botânico, Rio de Janeiro, Brazil; Instituto de Botânico, São Paulo, Brazil. Special collections were very kindly donated by the following persons:— Dr. R. C. Ching, Mr. E. F. Constable, Mr. P. S. Green, Dr. J. Lovis, Dr. H. S. McKee, Mrs. P. R. Messmer, Mr. C. V. Morton, Mrs. P. Ralston, Mr. L. S. Smith and Dr. M. Tagawa.

I wish to thank the examiners for my Doctor of Science thesis at the University of Sydney for their report on my monograph with its helpful suggestions to be incorporated before publication. Dr. Barbara Briggs and Mr. G. Brownlie have kindly allowed me to include several unpublished chromosome counts, also I am indebted to Prof. I. Manton who gave me permission to include several unpublished chromosome counts for *Lastreopsis* in Contr. N.S.W. Nat. Herb., Fl. N.S.W., No. 211 (1961). I wish to thank Prof. R. E. Holttum for examining several type specimens at The Kew Herbarium, as well as for suggesting that I should undertake this monograph. My thanks are also due to Mr. A. Rodd for preparing the anatomical sections of *Lastreopsis* and *Ctenitis* where were kindly photographed by Mr. A. Searle and Mr. K. Bamber. I am grateful to Mme. Tardieu-Blot (Paris), Dr. K. U. Kramer (Utrecht), Dr. R. C. Ching (Peking) and Mr. C. Jermy (London) for the examination of types of several species of *Lastreopsis*, as well as to Mr. C. V. Morton (Smithsonian Institution) for selecting a great deal of material to be sent to Sydney for my study. The following herbaria also supplied photographs of type specimens:— The Herbarium, Berlin-Dahlem; The Herbarium, Kew, and the British Museum (Natural History), London. My thanks are also due to Mr. H. K. Airy-Shaw for checking my latin diagnoses as well as to the staff of the herbarium at the Jardin Botanique de l'État, Brussels, for checking the spelling of certain localities in the Republic of the Congo.

Plate IX M.D. Tindale del.

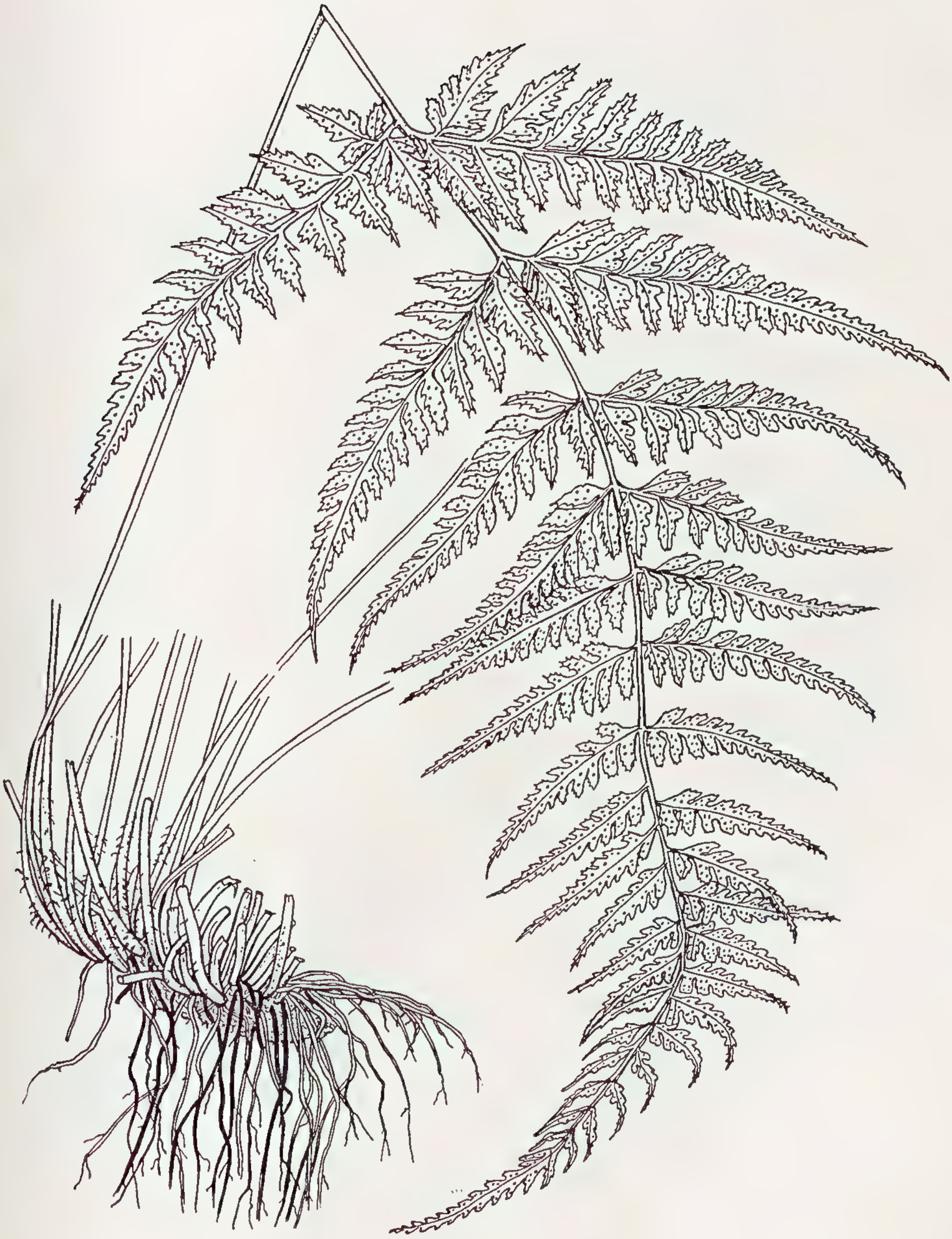


Lastreopsis spp.

1. *L. microsora*, ultimate segments of lamina with indusiate sori on free veins, × 4. 2. *L. decomposita*, lower surface of secondary rhachis with stellate hairs, cylindrical glandular hairs and bullate scales, × 49. 3. *L. microsora*, spore with perispore, × 900. 4. *L. hispida*, reniform indusium with cylindrical glandular hairs, × 43. 5. *L. marginans*, indusium with round, glandular hairs, × 63. 6. *L. hispida*, a *Ctenitis*-hair, × 70. 7. *L. hispida*, club-shaped hairs, × 70.

Plate X

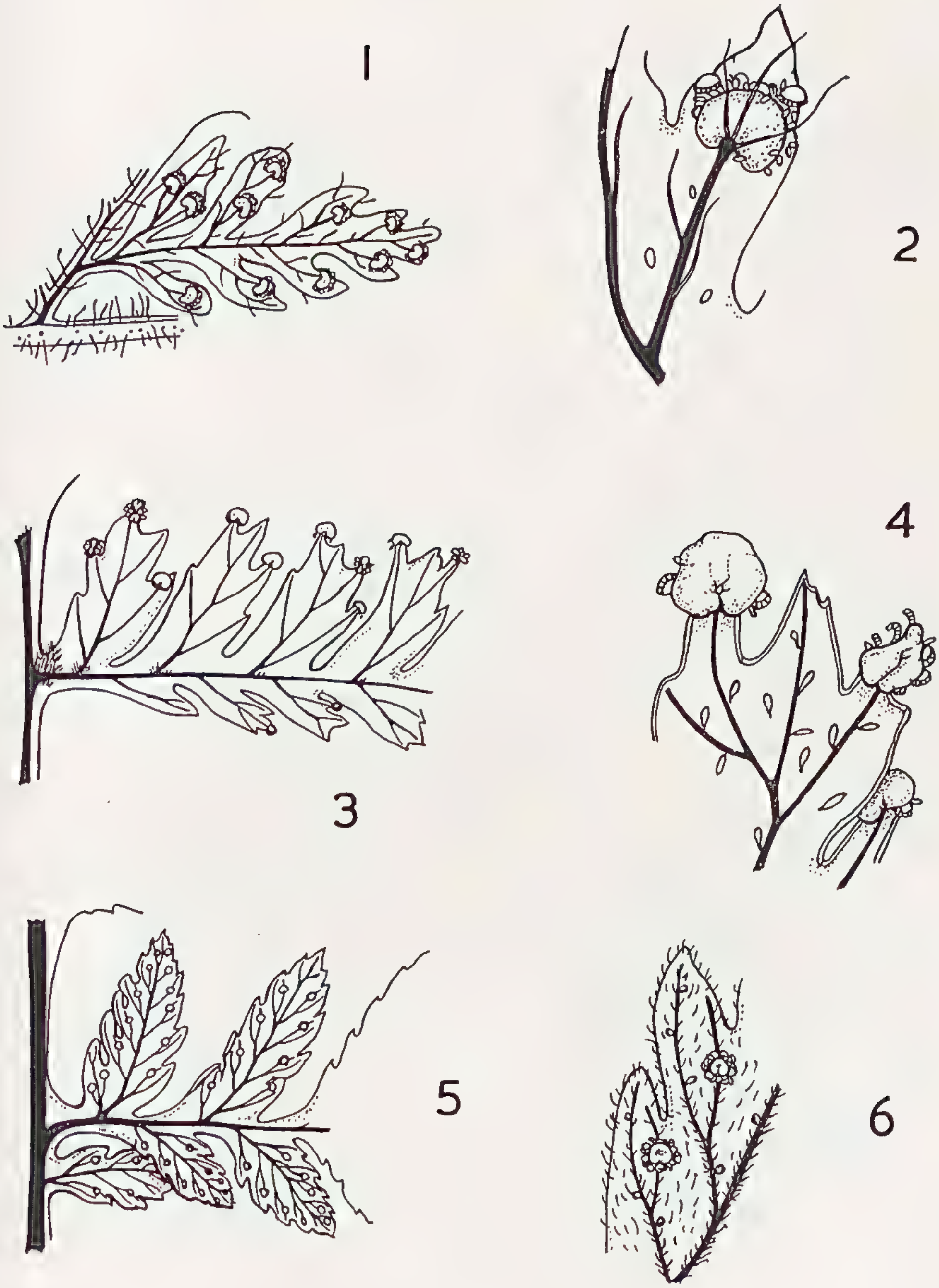
M.D. Tindale del.



Lastreopsis shepherdii
Habit study, × 4/9.

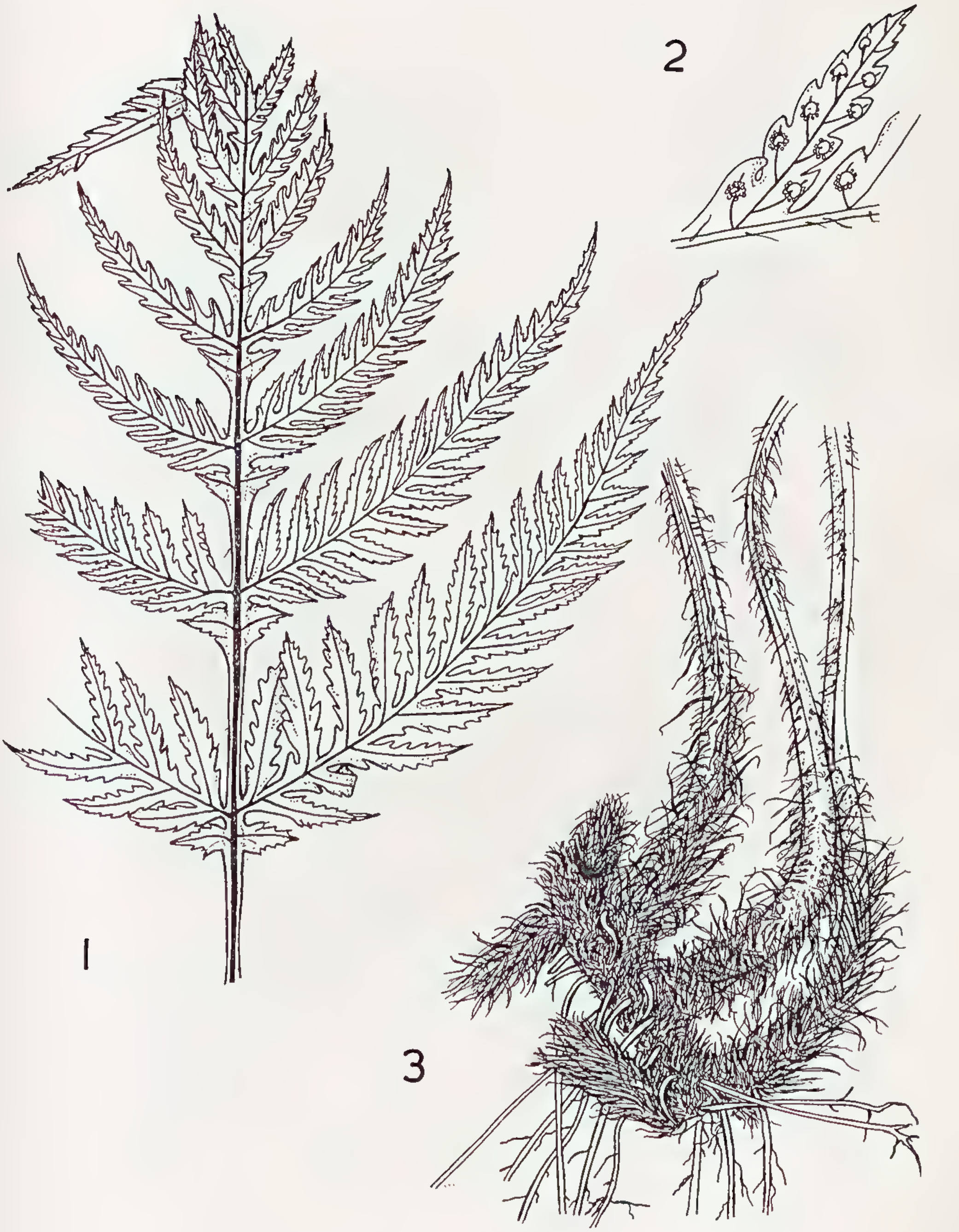
Plate XI

M.D. Tindale del.



1. *Lastreopsis subsericea*, tertiary pinna, × 3⅓. 2, ditto, a lobe with a sorus, × 15. 3. *L. nephrodioides*, basal portion of a tertiary pinna, × 3⅓. 4, ditto, apical portion of an ultimate segment with 3 sori, × 15. 5. *L. tenera*, basal portion of a secondary pinna, × 2⅔. 6, ditto, portion of a tertiary segment with 2 sori, × 15.

Plate XII M.D. Tindale del.

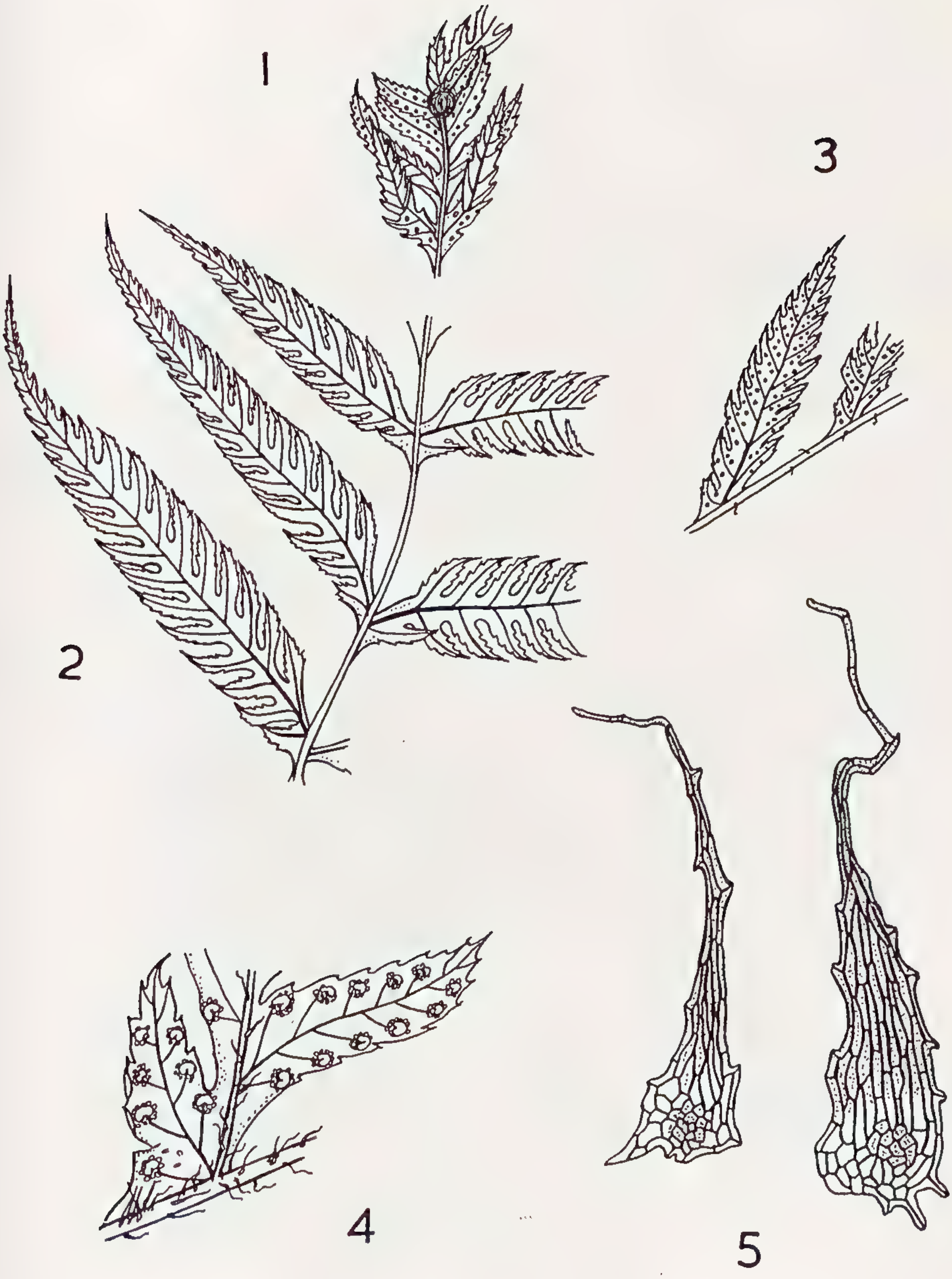


Lastreopsis vieillardii

1. Apical portion of lamina, × $\frac{2}{3}$. 2. Sessile secondary pinna with indusiate sori, × $1\frac{1}{2}$.
3. Rhizome, × $\frac{2}{3}$.

Plate XIII

M.D. Tindale del.

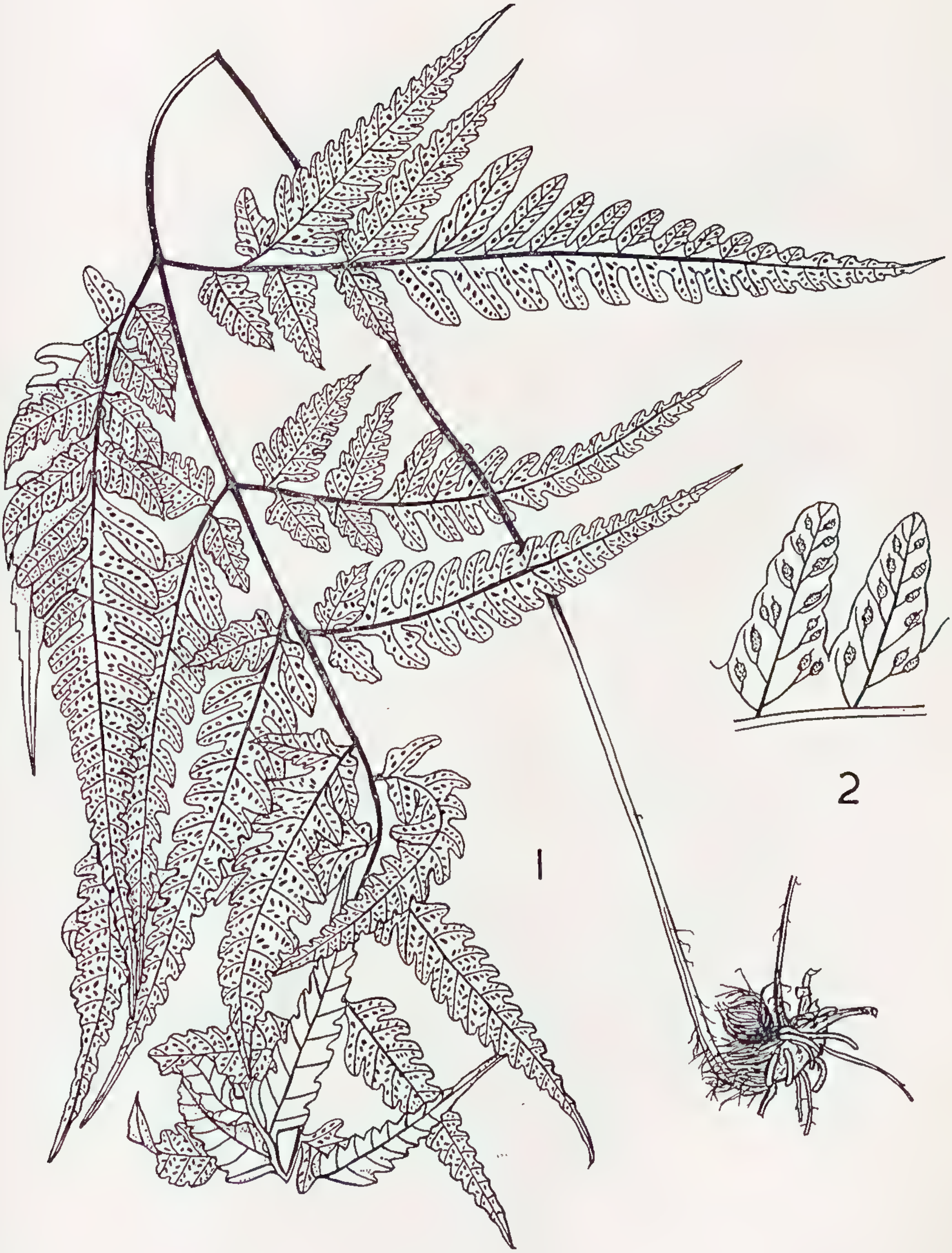


Lastreopsis acuta

Specimen Herb. Christensen No. 2872. 1. Apex of lamina with gemmiferous bud, × ⅔. 2. Several pairs of middle primary pinnae, × ⅔. 3. Secondary pinna on lowest pair of primary pinnae, × ⅔. 4. Basal portion of secondary pinna with indusiate sori, × 3⅔. 5. Scales of the secondary rhachis, × 80.

Plate XIV

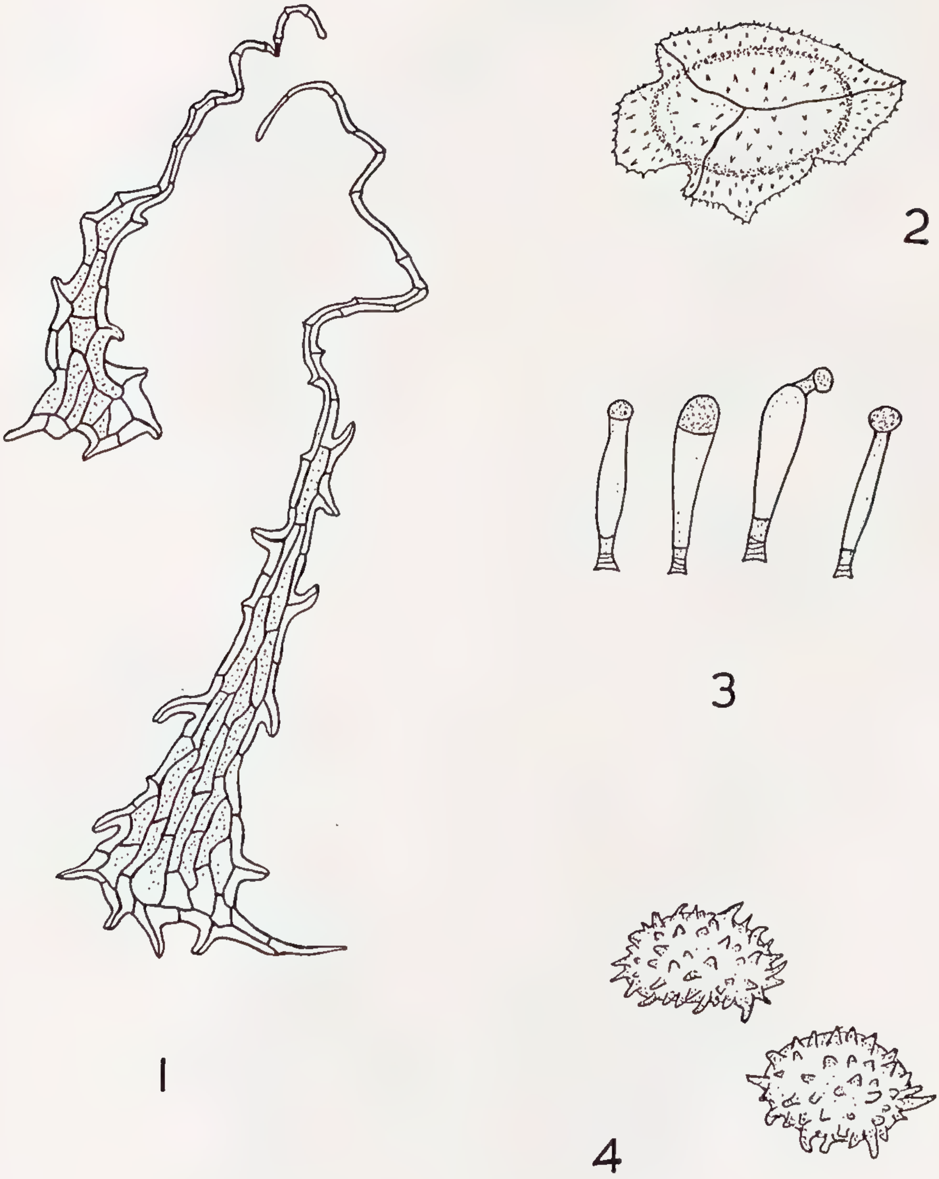
M.D. Tindale del.



Lastreopsis subsimilis

1. Habit study, Leeuwenberg No. 2507, × 4/9. 2. Secondary pinnae, × $1\frac{1}{5}$. The stipe is darkened for contrast in this illustration.

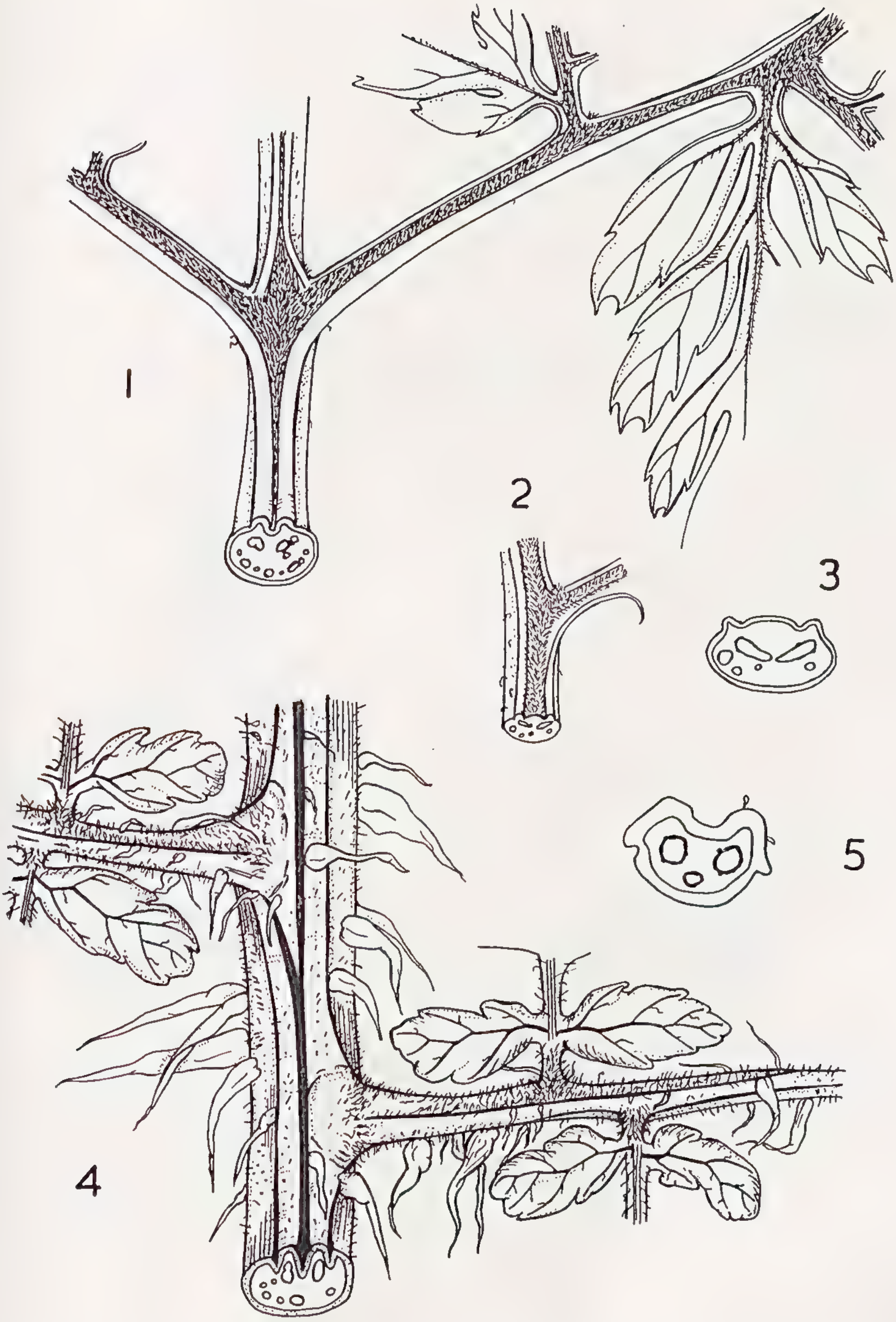
Plate XV M.D. Tindale del.



1. *L. amplissima*, 2 scales of secondary rhachis, × 33. 2. *L. hispida*, finely echinulate spore, × 576. 3. *L. davallioides*, hairs of the upper surface of main rhachis, × 88. 4. *L. subsericea*, 2 echinate spores, × 420.

Plate XVI

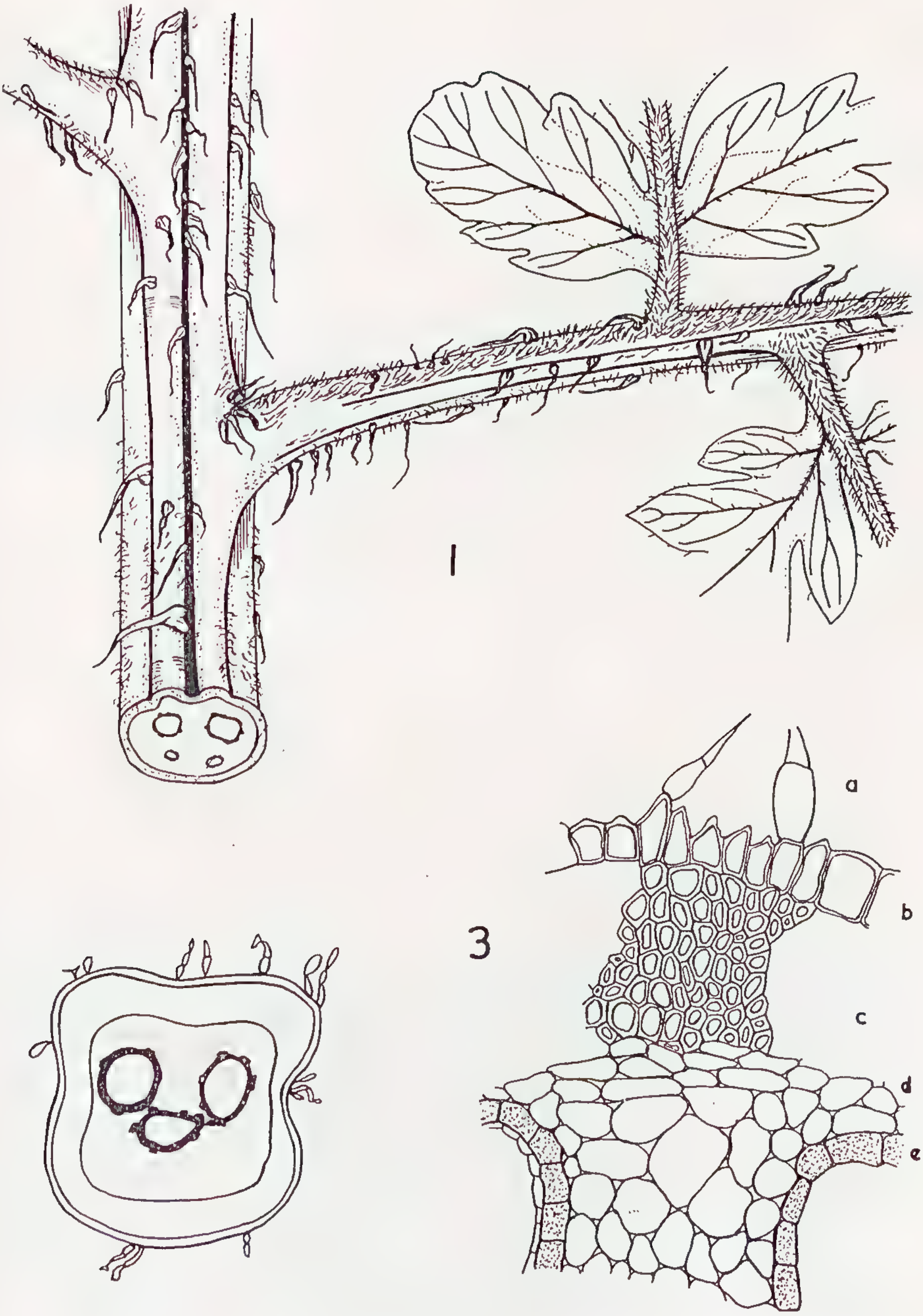
M.D. Tindale del



1—3. *Lastreopsis smithiana* 1. Adaxial surface of portion of main and secondary rhachises, × 6⅔. 2. Adaxial surface of central portion of main rhachis, × 6⅔. 3. T.S. central portion of main rhachis, × 18. 4—5. *Ctenitis maximowicziana* 4. Adaxial surface of a portion of stipe, main and secondary rhachises, × 6⅔. 5. T.S. lowest secondary rhachis, × 20.

Plate XVII

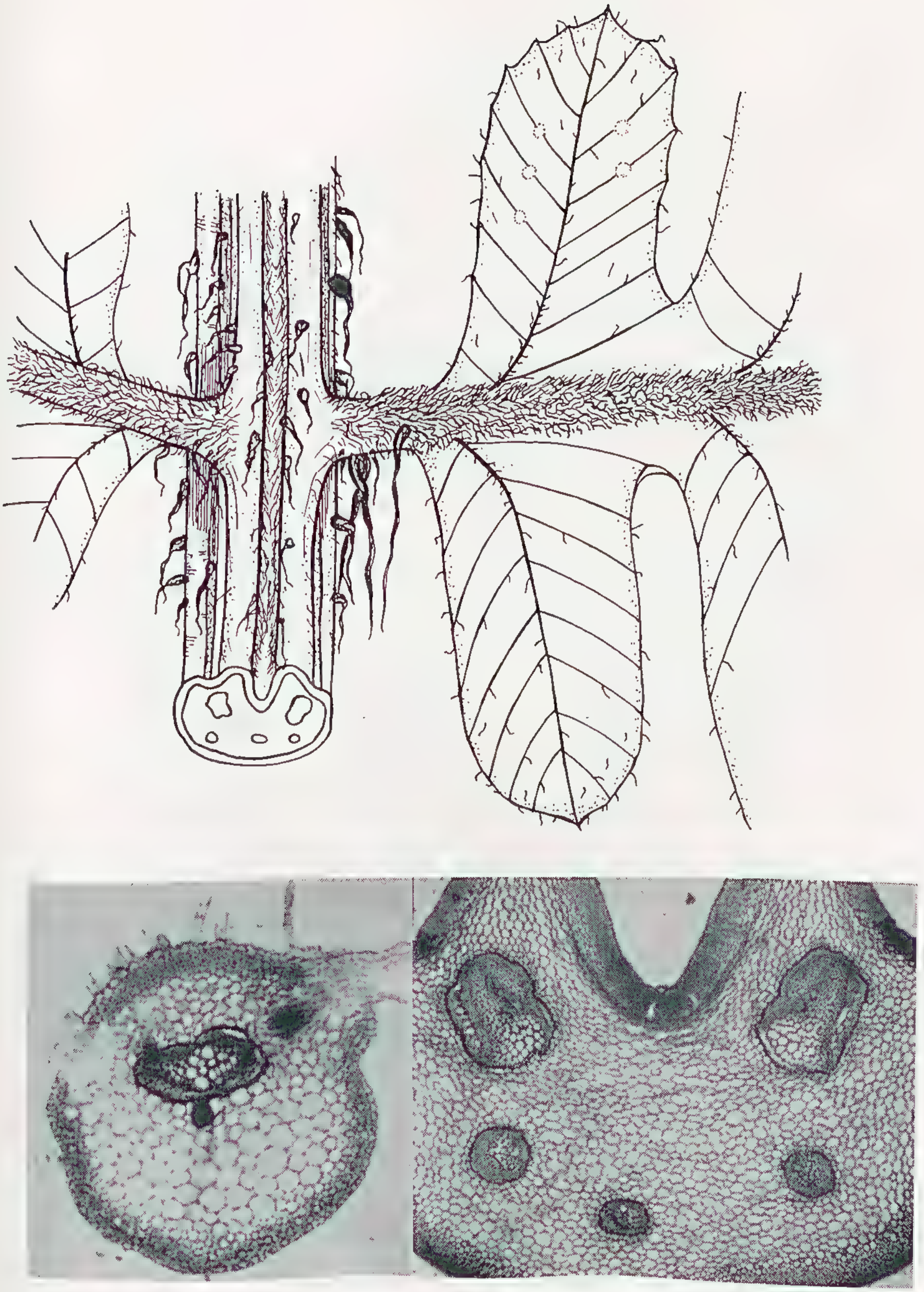
M.D. Tindale del.



Ctenitis vilis

1. Adaxial surface of main and secondary rhachises, $\times 6\frac{2}{3}$. 2. T.S. lowest secondary rhachis, × ca. 24. 3. Anatomical details of T.S. secondary rhachis, a. hair, b. epidermis, c. sclerenchyma, d. parenchyma, e. dark endodermis, × 80.

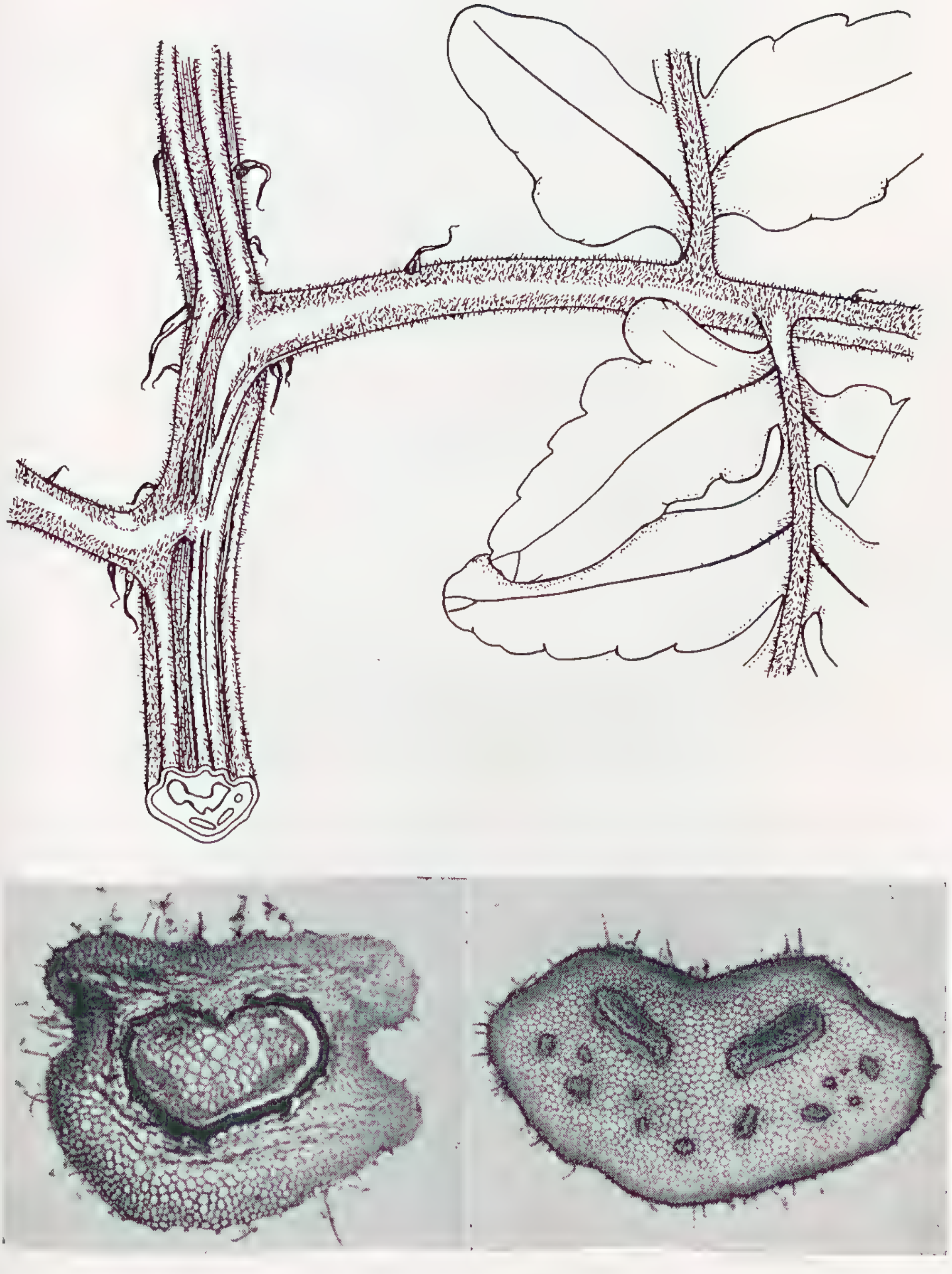
Plate XVIII



Ctenitis submarginalis

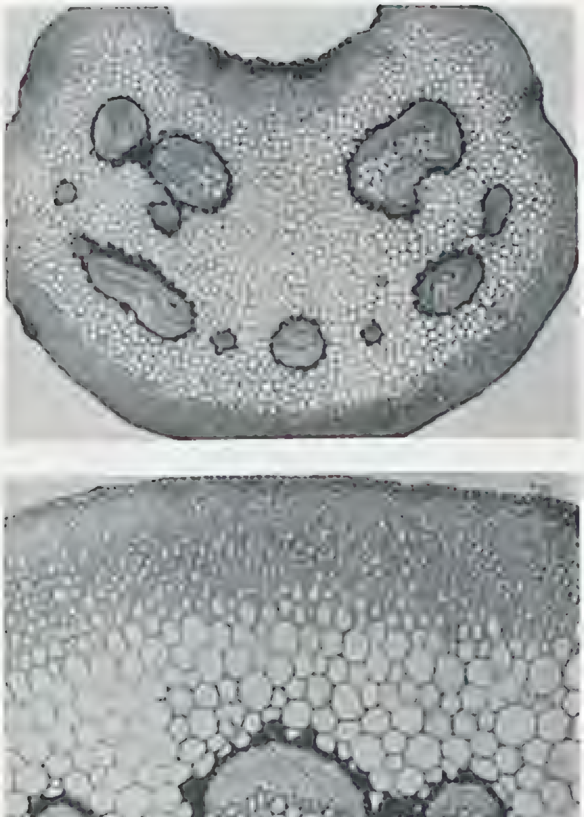
Upper: Adaxial surface of main and 2 secondary rhachises, × $6\frac{2}{3}$, M.D. Tindale del. L.H.S.: T.S. Secondary rhachis, × ca. 47. R.H.S.: T.S. Portion of upper stipe, × ca. 17. Photographs by A. Searle.

Plate XIX



Upper: *Ctenitis protensa* var. *funesta*, adaxial surface of upper portion of stipe and lower main rhachis, × $6\frac{2}{3}$, M.D. Tindale del. L.H.S.: *C. protensa* var. *funesta*, T.S. secondary rhachis, × 42. R.H.S.: *C. protensa* var. *protensa*, T.S. portion of the upper stipe, × 19. Photographs by A. Searle.

Plate XX

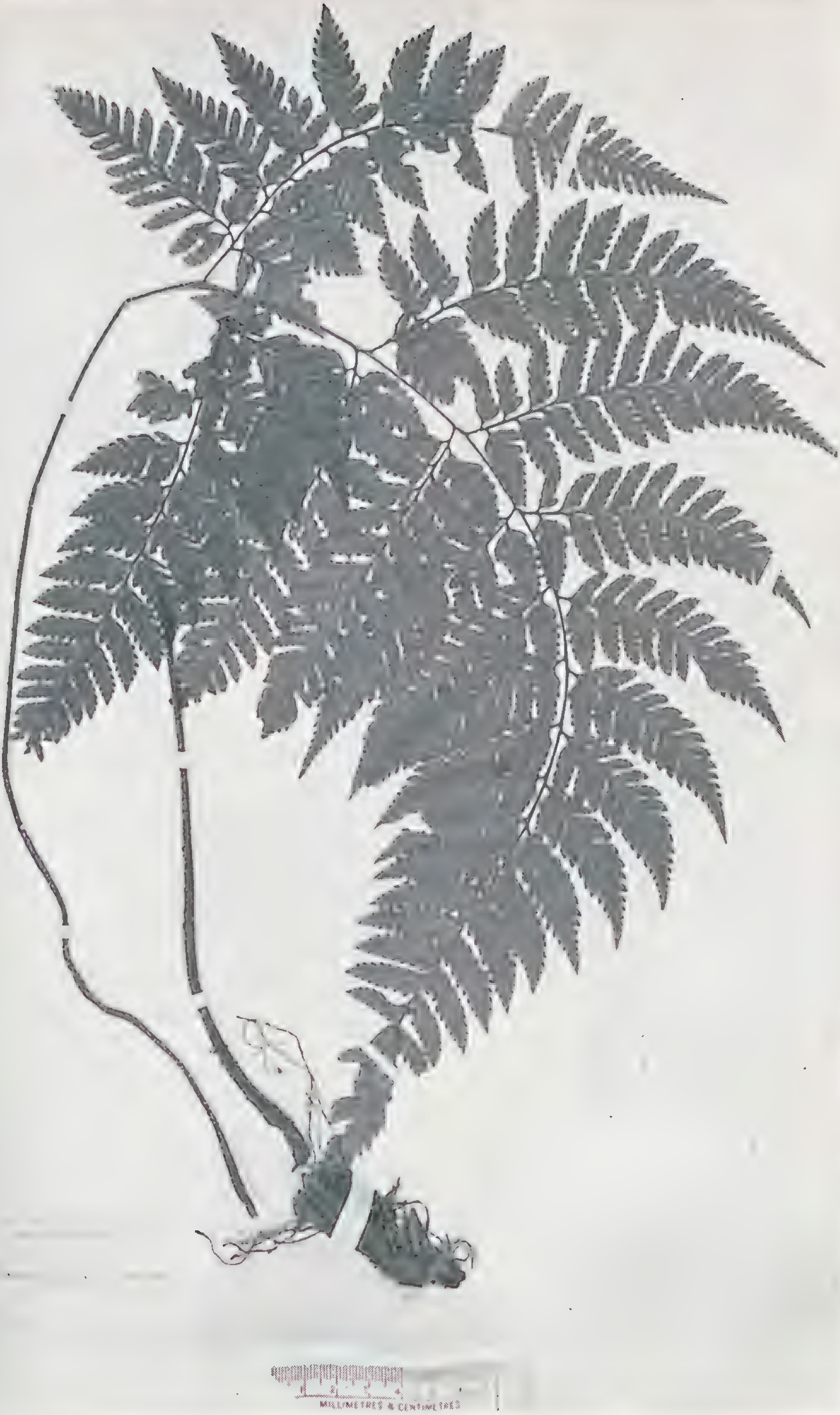


Lastreopsis smithiana

Upper: T.S. upper portion of stipe, × 19, photograph by A. Searle. Middle: Part of the latter section showing anatomical details (from top to bottom):—epidermis, sclerenchyma, parenchyma and vascular bundles surrounded by dark endodermis, × 50, photograph by K. Bamber. Bottom: T.S. secondary rhachis, × 25, photograph by A. Searle.

Plate XXI

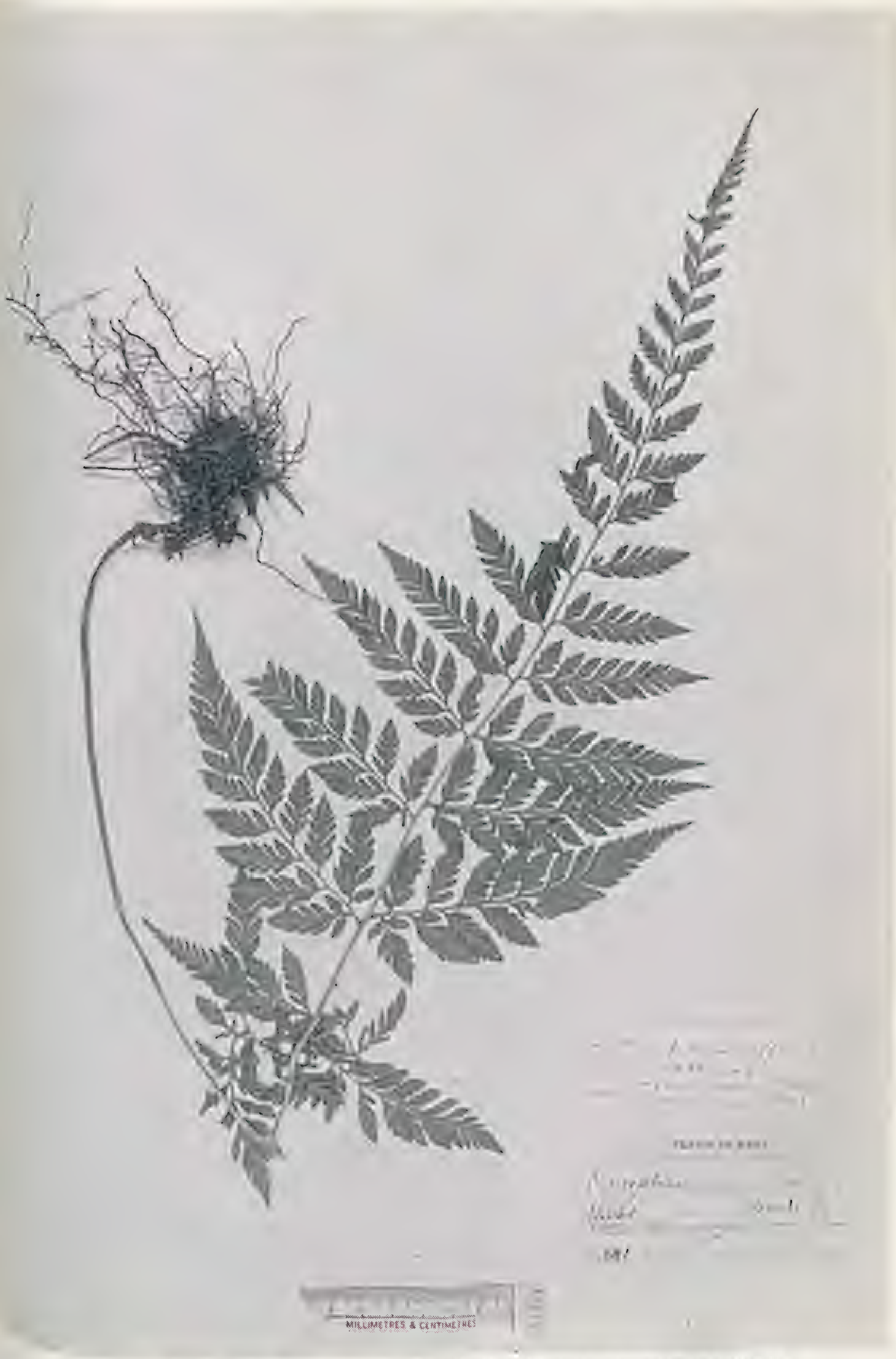
Photograph by A. Searle



Lastreopsis effusa (Sw.) Tindale ssp. *divergens* (Willd.) Tindale. A specimen collected by A. Fendler No. 45 in Trinidad, West Indies.

Plate XXII

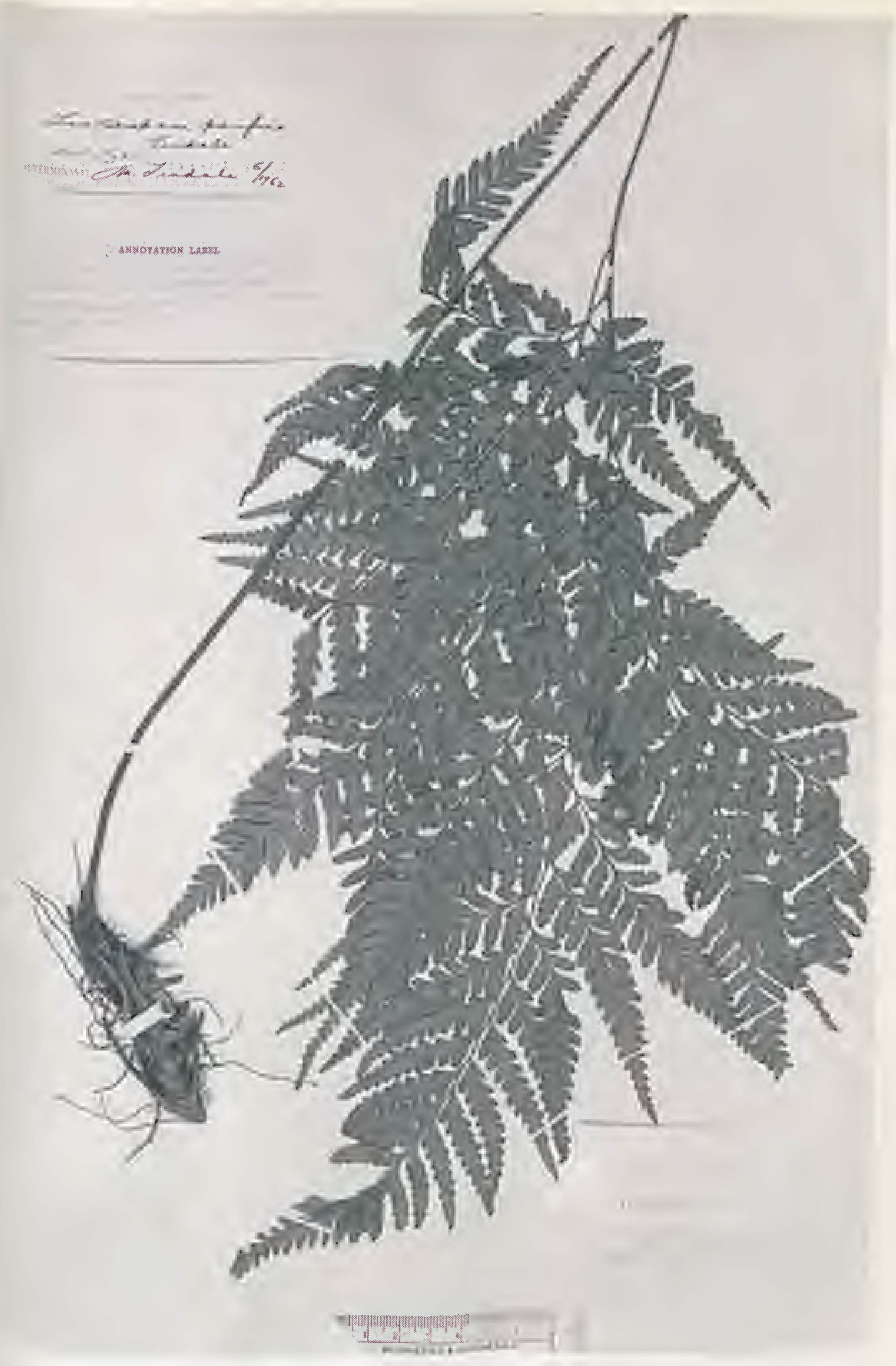
Photograph by A. Searle



Lastreopsis effusa (Sw.) Tindale ssp. *confinis* (C. Chr.) Tindale. A specimen collected

Plate XXIII

Photograph by A. Searle



Lastreopsis pacifica Tindale:— Holotype collected by M.L. Grant No. 3541 at Diadem Camp, Tahiti (UC 437995)

Supplement to the Key to the Genera of Rhodophyceae (Red Algae) Hitherto Recorded from Australia

VALERIE MAY

INTRODUCTION

In 1953 I published " A Key to the Genera of Rhodophyceae (Red Algae) Hitherto Recorded from Australia " (Contrib. N.S.W. Nat. Herb. II, No. 1, 13-37). Since then inevitably there have been changes; some genera need to be added to the list, while other generic names are now rejected in favour of more acceptable ones.

In order to make the generic key up to date, and so a suitable basis for my Key to the Species of Rhodophyceae (published in the present journal, p. 349), certain additions to the original work are needed. In the " Alphabetic List of the Genera in the Key " (1953, p. 14-17) should be interpolated those genera here listed on p. 341-2. Likewise the genera here listed on p. 342-3 need to be removed from this original list.

In the body of the original paper certain interpolations are also necessary. These are listed below, given in sequence by page number of the original paper. For example, the first entry is p. 17, so one reads page 17 of the " Key " as far as the indentation 4, then reads the interpolation (keying *Stylonema* and *Asterocystis*) and then continues with the original key from the indentation 4*.

It is unfortunate that the entire completed key cannot be republished, but it is hoped that the original key together with the two papers of the present journal can be used together to function as a complete Key to the Rhodophyceae of Australia.

ALPHABETICAL LIST OF ADDITIONAL GENERA IN THIS KEY

Genus	Page no. for insertion in original key.
Asterocystis	17
Beckerella	22
Carradoria	26
Chauviniella	31
Chondrococcus	23
Coloconema	20
Corynospora	20
Crassilingua	32, 33
Dermatolithon	18
Diapse	23
Dictyurus	19
Diplocladia	26

Dolichoscelis	26
Echinosporangium	30
Echinothamnion	26
Endosiphonia	24
Fernandosiphonia	25
Gonatogenia	25
Gulsoniopsis	22
Husseyella	27
Kylinia	20
Malaconema	24
Martensia	36
Mastophora	18
Neoardissonia	27
Nothocladus	20
Pityophykos	26
Polyporolithon	18
Prionitis	35
Ptilophora	22
Rhodochorton	20
Rhodolophia	24
Sarcotrichia	24
Stylonema	17
Sympodophyllum	31
Tolypiocladia	26
Thaumatella	25
Vanvoorstia	30
Webervanbossea	19
Womersleya	36

ALPHABETICAL LIST OF GENERA TO BE REMOVED FROM PREVIOUS KEY

Genus	Page no. where occurring in original key.
Ardissonea	27
Bindera	19
Chauvinia	31
Chondrophyllum	36
Desmia	23
Goniotrichum	17
Husseya	27

Maschalostroma	25
Mesotrema	36
Neomonospora	20
Pachyglossum	32, 33
Pityopsis	26
Roschera	26
Sonderia	30
Zanardinula	35

INTERPOLATIONS TO " A KEY TO THE GENERA OF RHODOPHYCEAE (RED ALGAE) HITHERTO RECORDED FROM AUSTRALIA " (1953)

p. 17

4. With wide gelatinous sheath and pseudo-branching. Microscopic epiphyte only. Gonidia without cell division 4A
   4A. Cells pink .... †**Stylonema** *Reinsch.*
   4A.* Cells blue .... **Asterocystis** *Gobi*

p. 18.

9. Attached by rhizoids 9A
   9A. Conceptacles present .... **Mastophora** *Decne.*
   9A.* Conceptacles absent .... **Peyssonnelia** *Decne.*

11.* Tetrasporic conceptacle with more than one ostiole 14A
   14A. Hemiparasitic .... **Polyporolithon** (*Foslie*) *Mason*
   14A.* Not hemiparasitic 14

13.* No heterocysts present in thallus 13A
   13A. Hypothallium mono- or di-stromatic, of obliquely elongated cells. Plant epiphytic or epizoic .... **Dermatolithon** *Foslie*
   13A.* Hypothallium polystromatic, of isodiametric cells. Plant usually on rocks, etc. .... **Lithophyllum** *Phil.*

p. 19.

28.* Thallus not tubular 28A
   28A. Secondary branches form a network of tissue which encloses an uninterrupted spiral cavity about the main axis .. **Dictyurus** *Bory*
   28A.* Not as above 37

34. Tetraspores in sori. Diaphragms absent ..... ††**Webervanbossea** *J. de Toni*

---

† Syn. *Goniotrichum* Kuetz. 1843, non *Erythrotrichia* Aresch. 1850; see Drew-Baker (1956, p. 13-4).

†† Syn.: *Bindera* Harv. 1859, non *Bindera* J. Ag. 1841; see Kylin (1956, p. 329) and De Toni (1936).

p. 20.

42. Plant microscopic, endo- to epi-phytic, little branched. Spores terminal 42A
    - 42A. Plant minute, epiphytic on *Acrochaetium* and bearing hyaline androphore cells .... **Kylinia** *Rosenv.*
    - 42A.* Not bearing hyaline androphore cells 42B
        - 42B. Wholly endophytic .... **Coloconema** *Batt.*
        - 42B.* Not wholly endophytic (except in *Liagora*) **Acrochaetium** *Naeg.*

43. Branching not verticillate 43A
    - 43A. From marine collections only .... †**Corynospora** *J. Ag.*
    - 43A.* From freshwater collections only .... **Nothocladus** *Skuja*

47. Tetrasporangia cruciately divided 47A
    - 47A. Basal prostrate portion bearing upright branches; other branching absent or alternate .... **Rhodochorton** *Naeg.*
    - 47A.* Usually 2 to 4 ramuli arising at each node 48

p. 22.

64.* Not gelatinous 64A
    - 64A. Cystocarps occur throughout thallus on dwarf indeterminate branches. Tetraspores appear cruciately arranged .... **Gulsoniopsis** *Hommersand*
    - 64A.* Not as above 65

76.* Two ostioles per cystocarp 76A
    - 76A. Thallus with a distinct inner cortical zone of large parenchymatous cells 76B
    - 76A.* Thallus lacking this distinct cortical inner zone .. **Gelidium** *Lamour.*
        - 76B. Ramuli from margin .... **Beckerella** *Kylin*
        - 76B.* Ramuli from surfaces .... **Ptilophora** *Kuetz.*

p. 23.

88. Apices often inrolled. Cortex parenchymatous ....††**Chondrococcus** *Kuetz.*

88.* Branches pinnate 89A
    - 89A. Branch primordia originate alternately from the main axis .... **Euptilota** *Kuetz.*
    - 89A.* Branch primordia originate in opposite pairs from the main axis .... **Diapse** *Kylin*

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† Syn.: *Monospora* Solier 1845, non *Monospora* Hochstetter 1841; *Neomonospora* Setch. & Gard. 1937; see Kylin (1956, p. 385).

†† Syn.: *Desmia* Lyngb.; *Chondrococcus* is used in preference, following Silva (1952, p. 306).

p. 24.

103. Marginal "flanking" cells present, equal to, or half the length of, the pericentral cells 103A

103.* No marginal " flanking " cells present in vegetative thallus 106

103A. " Flanking " cells the same length as the pericentral cells... **Endosiphonia** *Zan.*

103A.* Marginal " flanking " cells half the length of the pericentral cells present on flattened branches 104

104. Flanking cells present only on some branches. Plant minute **Taenioma** *J. Ag.*

104.* Flanking cells present on all branches 105

105. Free monosiphonous filaments present .. **Sarcotrichia** *Wom. & Shep.*

105.* Free monosiphonous filaments absent 105A

105A. Flanking cells not dividing further in vegetative thallus .... **Platysiphonia** *Borgs.*

105A.* Flanking cells dividing further in vegetative thallus giving a compressed thallus .... **Sarcomenia** *Sond.*

106. Stichidia (only) with flanking cells. Tetraspores cruciate.. **Malaconema** *Wom. & Shep.*

106.* Not as above 106A

106A. Ramuli wholly or in part monosiphonous 107

106A.* Ramuli polysiphonous, sometimes bearing trichoblasts 119

110. Cortication developed early 110A

110A. Pericentral cells 4. Tetrasporangia cruciately divided... **Doxodasya** *Schmitz*

110A.* Pericentral cells 5-7 .... 110B

110B. Pericentral cells 5 .... **Micropeuce** *J. Ag.*

110B.* Pericentral cells 7 .... **Rhodolophia** *Kylin*

p. 25.

111.* Tetrasporangia tetrahedrally divided 111A

111A. Pericentral cells 4 .... **Thaumatella** *Kylin*

111A.* Pericentral cells 7 .... **Brongniartella** *Bory*

117. Fine branches arising in axils of larger branches .... †**Gonatogenia** *J. Ag.*

119. Tertiary branches developed only on the adaxial side of the secondary branches .... **Fernandosiphonia** *Levr.*

119.* Not as above 119A

119A. Plant dorsiventral 120

119A.* Plant not dorsiventral 128

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† Syn.: *Maschalostroma* Schmitz, following Kylin (1956, p. 512).

p. 26.

134.* Branches from all sides, but not as above. Pericentral cells up to 24 (but not 5). Rarely with parenchyma all over. Cystocarp ovate or urceolate 134A

134A. Without vegetative trichoblasts .... **Carradoria** *Mart.*

134A.* With vegetative trichoblasts 134B

134B. Pericentral cells 7. Special short branches present.... .... **Diplocladia** *Kylin*

134B.* Pericentral cells 4 to numerous. Without special short branches .... **Polysiphonia** *Grev.*

136. Short branches borne in tufts 136A

136A. Trichoblasts not branched .... **Tolypiocladia** *Schmitz*

136A.* Trichoblasts branched .... **Echinothamnion** *Kylin*

138. Branches wholly verticillate or umbellate 138A

138A. Segments mostly articulate-constricted ...... **Coeloclonium** *J. Ag.*

138A.* Segments only slightly constricted .... **Dolichoscelis** *J. Ag.*

139. Ramuli flattened .... †**Pityophykos** *Pap.*

p. 27.

146.* Plant up to 20 cm. in height .... ††**Husseyella** *Pap.*

155.* Plant not as above .... †††**Neoardissonia** *Kylin*

p. 28.

166.* Not as above; Cells not constant in arrangement 166A

166A. Tertaspores tetrahedrally divided .... **Hymenocladia** *J. Ag.*

166A.* Tetraspores zonately divided .... **Eucheuma** *J. Ag.*

p. 30.

194.* Tissues arising from sides of axis differ, but both are represented; one side winged 194A

194A. Final branches from inside flattened ...... **Echinosporangium** *Kylin*

194A.* Final branches from inside not flattened ...... **Cliftonaea** *Harv.*

195. Branches unattached at one end present within fenestrate portion ... . ††††**Vanvoorstia** *Harv.*

201.* Pericentral cells usually 5 203

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† A new name proposed by Papenfuss (1958); Syn.; *Pithyopsis* Falk. 1897, non *Pityopsis* Nuttall 1841.

†† A new name proposed by Papenfuss (1958). Syn.: *Husseya* J. Ag. 1901, non *Husseia* Berk. 1847.

††† A new name proposed by Kylin (1956). Syn.: *Ardissonia* J. Ag. 1899, non *Ardissonia* De Not 1870.

†††† Syn.: *Sonderia* F. Muell. 1887, non *Sondera* Lehm. 1844; see Papenfuss (1956, p. 160).

p. 31.

207. Frond with narrow wings, or wingless .... **Rytiphloea** *Ag.*

218. Microscopic veins present 218A

218A. Intercalary cell tissue present in the midrib .... **Apoglossum** *J. Ag.*

218A.* Not as above .... **Sympodophyllum** *Shep. & Wom.*

220. Tetrasporangiate sori on one side of proliferations. Plant not excessively imbricate .... †**Chauviniella** *Pap.*

p. 32.

222. Thallus polystromatic throughout, not serrated. Lateral veins absent. Tetrasporangiate sori at margins .... ††**Crassilingua** *Pap.*

p. 33.

247. Apical growing cell present. Thallus many-layered. Tetrasporangiate sori at margins .... ††**Crassilingua** *Pap.*

p. 35.

276. Apices obtuse. Frond up to 7 cm. long .... †††**Prionitis** *J. Ag.*

p. 36.

289. Thallus fringed with open net-work. Cystocarps pyriform .... ††††**Martensia** *Hering.*

297.* Cystocarps scattered, not near the margins. Tetrasporangia tetrahedrally divided .... †††††**Womersleya** *Pap.*

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† Previously recorded under the genus *Chauvinia* Harv.; for discussion see Papenfuss (1956, p. 159).

†† Syn.: *Pachyglossum* J. Ag. 1894, non *Pachyglossum* Decne. 1838; see Papenfuss (1956, p. 160).

††† Syn.: *Zanardinula* D.T.; for discussion see Papenfuss (1950, p. 180).

†††† Syn.: *Mesotrema* J. Ag.; for discussion see Papenfuss (1950, p. 182).

††††† New name proposed by Papenfuss (1956). Syn.: *Chondrophyllum* Kylin 1924, non *Chondrophyllum* Necker 1790.

BIBLIOGRAPHY

Cribb, A. B., 1961.—Some Marine Algae from Thursday Island and Surrounding Areas. Univ. Qld. Papers, Dept. Bot. IV, No. 5, 51-59.

De Toni, J. B., 1936.—Noterelle di nomenclatura algologica VII. Primo elenco di Floridee omonime. Brescia.

Drew-Baker, K. M., 1956.—The Generic Names *Goniotrichum* Kuetz. and *Erythrotrichia* Aresch. Phyc. Bull. IV, 13-14.

Falkenberg, P., 1901.—Die Rhodomelaceen des Golfs von Neapel und der angrenzenden Meeres-Abschnitts. Fauna und Flora des Golfes von Neapel Monographie 26, 1-753, 10 figs., 24 pls. Berlin.

Fan, Kung-chu, 1961.—Morphological Studies of the Gelidiales. Univ. Calif. Publ. in Bot. XXXII, No. 5, 315-368.

Kylin, Harald, 1956.—Die Gattungen der Rhodophyceen. Gleerups, Lund, Sweden.

Levring, Tore, 1941.—Die Meeresalgen der Juan Fernandez-Inseln. Nat. Hist. Juan Fernandez and Easter Island, 601-669, pl. 49-53. Ed. Carl Skottsberg. Uppsala.

Levring, Tore, 1953.—The Marine Algae of Australia. I. Rhodophyta; Goniotrichales, Bangiales and Nemalionales. Arkiv. Botanik, Ser. 2, II, No. 6, 457-530.

Mason, Lucile R., 1953.—The Crustaceous Coralline Algae of the Pacific Coast of the United States and Canada and Alaska. Univ. Calif. Publ. Bot. XXVI, No. 4, 313-390, pl. 27-46.

May, Valerie, 1953.—A Key to the Genera of Rhodophyceae (Red Algae) Hitherto Recorded from Australia. Contrib. N.S.W. Nat. Herb. II, No. 1, 13-37.

Papenfuss, George F., 1950.—Generic Names of Algae Proposed for Conservation II. Madroño X, No. 6, 179-184.

Papenfuss, George F., 1956.—On the Nomenclature of some Delesseriaceae. Taxon V, No. 7, 158-162.

Papenfuss, George F., 1958.—Notes on Algal Nomenclature. IV. Various Genera and Species of Chlorophyceae, Phaeophyceae and Rhodophyceae. Taxon VII, No. 4, 104-109.

Setchell, William A., 1943.—*Mastophora* and the Mastophoreae; Genus and Subfamily of Corallinaceae. Proc. Nat. Acad. Sci. XXIX, 127-136.

Silva, Paul C., 1950.—Generic Names of Algae Proposed for Conservation. Hydrobiologia II, No. 3, 252-280.

Silva, Paul C., 1952.—A Review of Nomenclatural Conservation in the Algae from the Point of View of the Type Method. Univ. Calif. Publ. Bot. XXV, No. 4, 241-324.

Skuja, H., 1934.—Untersuchungen über die Rhodophyceen des Süsswassers. 4-6. Beiheft. bot. Centralbl., LII, B, Dresden.

Womersley, H. B. S. & Shepley, E. Ann, 1959.—Studies on the *Sarcomenia* Group of the Rhodophyta. Aust. Journ. Bot. VII, 168-223, pl. 1-5.

A Census and Key to the Species of Rhodophyceae (Red Algae) Recorded from Australia

VALERIE MAY

INTRODUCTION

Studies on any aspect of a flora are necessarily dependent upon a satisfactory system of classification of the forms of life which comprise it. Full benefit cannot be derived from any kind of observations on an organism without knowing to what population or taxon the observations refer; such taxon must be recognised by a stable name appropriately defined and circumscribed.

In Australia inadequate taxonomic knowledge of the algal flora is a serious handicap to studies on other aspects of this group of plants such as ecology, physiology and economic uses.

In this country the would-be student of Australian algology might well be deterred by its lack of documentation and any convenient means of entry into its complexities. In the past there have been few workers in this field; many of them have, to a large extent, worked in isolation and at a period prior to the adoption of the Type Concept in modern taxonomy. Type collections, and even some of the essential literature, were frequently not available to them; much the same situation obtains even at the present time.

The Australian sea coast is extensive and much of it has been very inadequately collected. Even those areas which have been most intensively examined still yield new records of distribution from time to time and much awaits discovery. Our herbarium collections, though of great value, contain too few authentically named specimens to enable accurate determinations of many species to be made.

It is evident that a satisfactory taxonomic knowledge of the Algae will not be attained until each genus has been thoroughly re-examined and revised, the criteria used for separating its component species re-assessed, Type Specimens traced and compared, new taxa described when necessary, all taxa clearly defined and adequate means of discrimination between them ascertained, their synonymy fully elucidated, and the geographic and ecological range of all species and infra-specific taxa determined.

Before such comprehensive studies could conveniently be undertaken, a compilation of all existing records of algal taxa from this country has seemed necessary, and an attempt to summarise the characters of the plants upon which such records have been based. This has been the objective in preparing the present paper in respect of all Australian records of genera and species of the Rhodophyceae.

The characters given in the following pages are in general those that have been described by the various authors who have described or conducted further studies on the taxa, supplemented and/or verified by my own observations when material has been available to me for study. I have collected extensively at many sites on the coast-line and made field observations on the distribution, ecology and appearance in vivo of a substantial proportion of the species considered in this paper.

Much information has been gained, and incorporated in this key, from the few revisions of algal genera that have appeared in more recent times, especially when these have included species recorded from this country. Unfortunately such revisions have not always elucidated or even mentioned all of the Australian records that have been made under a particular genus. For instance, even the excellent revision of the genus *Phacelocarpus* of the Order Gigartinales by Kylin (1932) omits any mention of *P. densus* Aresch.

In many cases new species have been described by early workers but their record stands in isolation and no further information has become available, nor have the Type Specimens as yet been traced and re-examined. Until more becomes known about them (such as the information provided on *Galaxaura conglutinata* Kjellm. by Svedelius (1945) quoted on p. 358) the record remains insecure and unsatisfactory.

Of the major groups of marine Algae the Rhodophyceae are perhaps the least well known. It is hoped that the present census of the taxa so far recorded from Australia, together with a ready means of differentiating the recorded species, will provide a foundation for further work on this group. It is felt that a working key will assist in the practical sorting of the algal flora, so that any future algologist may not have to face well-nigh overwhelming difficulties in gaining a general knowledge of the group, and it will perhaps facilitate the selection of suitable sections in which to practice the intensive analyses which alone can provide a completely satisfactory foundation of taxomic knowledge.

Both the number and the circumscription of the species given in this paper are almost certain to change with further investigation, but a tentative start towards their enumeration and description is already overdue.

In some earlier publications question marks have sometimes been interposed between generic and specific epithets, e.g. *Gelidiopsis* (?) *acrocarpa* (Harv.) Schmitz in Lucas (1909). These question marks have been omitted in the present paper, not because the identity of such species has been confirmed, but because it is considered that so much of the taxonomic work to date rests upon insecure foundations that it serves no useful purpose to indicate doubt in isolated cases only. Thorough investigation is required in virtually all cases.

The present key is intended to be used in conjunction with the generic key already published (May, 1953), and with the Supplement to it which appears in the present journal (p. 341-8).

In cases where a genus or species has previously been recorded here by a name now regarded as a synonym, the old name is indexed at the back of this paper and also indicated in a note under the genus in which it is now placed in the key, so that earlier Australian records can be related to the names here adopted. Names of genera or species of Rhodophyceae which have appeared in Australian records can thus be traced through the index of this paper. No attempt has been made to provide complete synonymy; this must await the completion of more intensive studies. Some early synonyms listed by Lucas (1909-12) have been omitted since it is assumed that the reader will be familiar with his publications.

A few necessary new combinations are effected on pages 351-2.

No key is as satisfactory as experience in handling and examining the plants concerned, especially when the experience is gained with the aid of a reliable collection of herbarium specimens for comparison. However an available key is more convenient for use while gaining such experience than are scattered references alone. In the preparation of the present census and key all available literature has been consulted. Although this key does not supply complete descriptions of the species, it should facilitate identification of any Australian member of the Rhodophyceae provided that the species has been previously recorded in Australia and that the material being examined is complete in all essential parts. Most of the Rhodophyceae are marine.

In some cases, e.g. *Galaxaura* and *Bostrychia*, a fairly complete assessment of the genus is available, and the various species that have been recorded appear to be distinct. In other cases published descriptions are so inadequate that the relevent portions of the present key, based on them, may prove less satisfactory, e.g. in *Wrangelia.*

I have omitted from the present key some twenty genera (see p. 352-3) that have been recorded, since their inclusion would be useless prior to a thorough revision or, in the case of the calcareous species, a re-examination of our specimens using modern techniques such as has been done of American species by Mason (1953). A few species whose descriptions are inadequate are mentioned in a note under the respective genus, but not characterised in the key.

In this paper the genera are arranged in the sequence in which they first appear in the generic key (May, 1953 and 1965); this sequence has resulted from the substantial use that has been made of anatomical structure of the thallus, which seems to provide both reliable and readily observable characters for purposes of differentiation.

Where a genus contains only one species recorded from Australia it is marked " only species " and its known characteristics may be ascertained from the generic key. Geographic distributions are indicated simply as T (Tasmania), N (northern), S (southern), E (eastern) and W (western) Australia, or as NE, for instance, where the range appears to be more limited. Further collections from less well known areas are necessary before more detailed knowledge of geographic ranges can be attained.

This paper will have achieved its purpose if it succeeds in stimulating increased interest in the algal flora of this country and facilitates in some measure the studies of future workers. Indeed its success may perhaps be judged by the speed with which it becomes obsolete.

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I wish to express my thanks to Dr. Joyce W. Vickery, National Herbarium of New South Wales, Sydney, for constructive criticism of the manuscript.

NEW COMBINATIONS

The following new combinations for Australian species are required and are effected here.

Corynospora elongata (*Harv.*) *May*, **n. comb.**

BASIONYM: *Callithamnion elongatum* Harv. 1860, Fl. Tasm. II, p. 336.

SYNONYM: *Monospora elongata* (Harv.) D.T. 1903, Sylloge Alg. IV, No. 3, p. 1,302.

Corynospora flabelligera (*Harv.*) *May*, **n. comb.**

BASIONYM: *Callithamnion flabelligerum* Harv. 1855, in Trans. Roy. Irish Acad. XXII, p. 562.

SYNONYM: *Monospora flabelligera* (Harv.) Schmitz 1897, in Engl. & Prantl. Natürl. Pflanzenfam., p. 489.

Corynospora griffithsioides (*Sond.*) *May*, **n. comb.**

BASIONYM: *Callithamnion griffithsioides* Sond. 1855, in Linnaea XXVI, p. 512, non *C. griffithsioides* Solier in Kuetz. 1849-69.

SYNONYM: *Monospora griffithsioides* (Sond.) D.T. 1903, Sylloge Alg. IV, No. 3, p. 1,302.

Corynospora licmophora (*Harv.*) *May*, **n. comb.**

BASIONYM: *Callithamnion licmophorum* Harv. 1858-63, Phyc. Austral. t. 90.

SYNONYM: *Monospora licmophora* (Harv.) D.T. 1903, Sylloge Alg. IV, No. 3, p. 1,301.

Crassilingua engelhardtii (*J. Ag.*) *May*, **n. comb.**

BASIONYM: *Pachyglossum engelhardtii* J. Ag. 1898, Sp. Alg. III, No. 3, p. 126; Kylin (1924), p. 50.

Crassilingua husseyana (*J. Ag.*) *May*, **n. comb.**

BASIONYM: *Pachyglossum husseyanum* J. Ag. 1894, Anal. Algol. Cont. II, p. 65; Kylin (1924), Lunds Univ. Årsskrift N.F. Avd. 2, XX, No. 6, p. 51.

Crassilingua marginifera (*J. Ag.*) *May*, **n. comb.**

BASIONYM: *Delesseria marginifera* J. Ag. 1884, Till. Alg. Syst. VII, p. 70.

SYNONYM: *Pachyglossum marginiferum* J. Ag. 1898, Sp. Alg. III, No. 3, p. 126; Kylin (1924), p. 50.

Crassilingua prolifera (*J. Ag.*) *May*, **n. comb.**

BASIONYM: *Nitophyllum proliferum* J. Ag. 1894, Anal. Algol. Cont. II, p. 63.

SYNONYM: *Pachyglossum proliferum* (J. Ag.) Kylin (1924), Lunds Univ. Årsskrift, N.F. Avd. 2, XX, No. 6, p. 50.

Curdiea rhizophora (*Lucas*) *May*, **n. comb.**

BASIONYM: *Sarcocladia rhizophora* Lucas 1935, Proc. Linn. Soc. N.S.W. LX, No. 3-4, 194-232, pl. 5-9.

Faucheopsis tasmanica (*J. Ag.*) *May*, **n. comb.**

BASIONYM: *Meristotheca tasmanica* J. Ag. 1876, Epicr., p. 583.

Myriogramme perriniae (*Lucas*) *May*, **n. comb.**

BASIONYM: *Nitophyllum perriniae* Lucas, 1931, Proc. Linn. Soc. N.S.W. LVI, No. 5, p. 408-9.

Stylonema elegans (*Chauv.*) *May*, **n. comb.**

BASIONYM: *Bangia elegans* Chauv. Alg. de Norman., 1826-31, p. 159.

SYNONYM: *Goniotrichum elegans* (Chauv.) Le Jol. 1863, Liste des Alg. Mar. de Cherborg, p. 103, f. 3-4.

GENERA OMITTED FROM KEY

Complete revision is needed of the following genera, which have been recorded from Australia, and for this undertaking the adoption of a lime-removal technique, as used by Mason (1953) is strongly recommended. The present records of species are regarded as extremely unreliable.

Archaeolithothamnion Rothpl.

Goniolithon Foslie
Lithophyllum Phil.
Lithothamnion Phil.
Melobesia Lamour.

The following genera are too greatly in need of revision for a key to the species to be of practical use at the present time.

Genus	Approximate number of species
Antithamnion Naeg.	15
Callithamnion Lyngb.	Many
Callophyllis Kuetz.	Many
Ceramium Wigg.	27
Chondria Ag.	16
Corallina L. emend Lamour.	12
Dasya Ag.	28
Gigartina Stackh.	>20
Griffithsia Ag.	14
Halymenia Ag.	12
Herposiphonia Naeg.	11
Hypoglossum Kuetz.	13
Jania Lamour.	7
Laurencia Lamour.	>20
Polysiphonia Grev.	25

ADDITIONAL DISTRIBUTION RECORDS

Batrachospermum atrum (Huds.) Harv. Now recorded for New South Wales.

Spyridia breviarticulata J. Ag. Now recorded for Eastern Australia.

DELETION

Sarcodiotheca colensoi (Hook. & Harv.) Kylin was listed by Dawson (1961, p. 225) as occurring in Australia. I can find no records of it closer than New Zealand.

KEYS TO GENERA

PORPHYRA Ag.

Following Levring (1953), I am including *Wildemania laciniata* Lucas and *Porphyra umbilicalis* Lucas under *Porphyra columbina* Mont.

1. Epiphytic in habit.
    2. Epiphytic on *Macrocystis*. Plant up to 25 cm. long. T .... **P. woolhousiae** *Harv.*
    2.* Epiphytic on seagrasses. Plant up to 2 cm. long. E .... **P. naiadum** *Anders.*

1.* Lithophytic in habit.
  3. Margin of thallus dentate. NE .... **P. denticulata** *Levr.*
  3.* Margin of thallus entire.
    4. Antheridia and carpospores forming a marginal border to the thallus. W, S, T, E .... **P. columbina** *Mont.*
    4.* Antheridia in longitudinal bands, separated by patches bearing carpospores. W, S .... **P. lucasii** *Levr.*

ERYTHROCLADIA Rosenv.

1. Branches compacted into a pseudoparenchymatous disc with an entire margin. W, S, T, E .... **E. subintegra** *Rosenv.*

1.* Branches, at least at the margin of the thallus, not laterally adjoined. W, S, T, E .... **E. irregularis** *Rosenv.*

STYLONEMA Reinsch.

SYNONYM: *Goniotrichum* Kuetz. 1843. I am accepting the generic epithet *Stylonema* Reinsch., following Drew-Baker (1956, p. 13-14), in preference to the more frequently used *Goniotrichum.*

Stylonema elegans has previously been reported also under the name *Goniotrichum alsidii* (Zan.) Howe; see Levring (1953).

Stylonema cornucervi has been previously reported under the name *Goniotrichum cornucervi* (Reinsch.) Hauck.

1. Plant 1-5 mm. long. W, S, T, E, NE .... †**S. elegans** (*Chauv.*) *May*

1.* Plant less than 1 mm. long. E, N .... **S. cornucervi** *Reinsch.*

ASTEROCYSTIS *Gobi*

Only species. S, E, N .... **A. ornata** (*Ag.*) *Hamel*

ERYTHROTRICHIA Aresch.

1. Thallus with a disc base. S, T .... **E. ciliaris** (*Carm.*) *Batt.*

1.* Thallus without a disc base.
  2. Plant 0·5-3 cm. long. W, S, T, E, N ...... **E. carnea** (*Dillw.*) *J. Ag.*
  2.* Plant up to 0·5 mm. long. E .... **E. australis** *Levr.*

BANGIA Lyngb.

B. ciliaris Carm. has now been transferred to *Erythrotrichia ciliaris* (Carm.) Batt., q.v.

1. Lithophytic in habit. Filament irregularly consisting of one to several series of cells at varying intervals. W, S, T, E .... **B. fuscopurpurea** (*Dillw.*) *Lyngb.*

1.* Epiphytic, usually on *Zostera.* Plant up to 4 cm. high. Filament consisting of a single series of cells. Lord Howe Island .. **B. simplex** *Lucas*

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† See page 352.

CHOREONEMA Schmitz

Only species. W, S .... **C. thuretii** (*Born.*) *Schmitz*

MASTOPHORA Decne.

Certain species that were previously recorded under the genus *Mastophora* are now placed in the genus *Metamastophora*, q.v.

Only species. N .... **M. affinis** *Foslie*

PEYSSONNELIA Decne.

Peyssonnelia australis Sond. has now been transferred to *Ethelia australis* (Sond.) W. v. B., q.v.

P. coccinea J. Ag., from the North and West, is too inadequately known to be included in the key.

1. Plant attached by its undersurface to the substratum, thin, crustaceous. S, T, E, N .... **P. gunniana** *J. Ag.*

1.* Plant upright, divided into linear segments.
  2. Colour bright reddish. S .... **P. novae-hollandiae** (*Kuetz.*) *Harv.*
  2.* Colour dull brown. Texture thick and rigid. W, E .... **P. multifida** *Harv.*

ARCHAEOLITHOTHAMNION Rothpl.

See page 352.

POLYPOROLITHON (Foslie) Mason

Only species. Hemiparasitic on *Ballia callitricha* (Ag.) Mont. Formerly recorded as *Melobesia patena* Hook. & Harv. S, T, E .... **P. patena** (*Hook. & Harv.*) *Mason*

FOSLIELLA Howe

Only species (previously recorded as *Melobesia farinosa* (Lamour.) Howe). W, S, NE .... **F. farinosa** (*Lamour.*) *Howe*

GONIOLITHON Foslie

See page 353.

DERMATOLITHON Foslie

Only species. W, S, E, N, Norfolk Is. .... **D. pustulatum** (*Lamour.*) *Foslie*

LITHOPHYLLUM Phil.

See page 353.

MELOBESIA Lamour.

See page 353.

LITHOTHAMNION Phil.

See page 353.

CORALLINA L. emend. Lamour.

See page 353.

JANIA Lamour.

See page 353.

METAGONIOLITHON W. v. B.

1. Plant fine.
    2. Ultimate branches di- to tri-chotomous, the lower fastigiate. Frond elongate, terete, slender. Cystocarps closely placed all around. W, S, N .... **M. gracile** (*Harv.*) *Yendo*
    2.* Branches tri-chotomous to verticillate. Ramuli long and umbellately branched at almost every joint. W, S, T .... **M. stelligerum** (*Lamour.*) *W. v. B.*

1.* Plant coarse.
    3. Joints up to 0·5 cm. long and no more than 1 mm. broad. W, S, E, N .... **M. graniferum** (*Harv.*) *W. v. B.*
    3.* Joints 1-3 cm. long and up to 2 mm. broad. W, S, T .... **M. charoides** (*Lamour.*) *W. v. B.*

CHEILOSPORUM Aresch.

1. Plant dwarf, dichotomous, fastigiate. Length of articulations equals 1½ times the width. W .... **C. pulchellum** *Harv.*

1.* Plant robust.
    2. Length of articulations nearly equals twice the width. Articulation thickened at the base, compressed in the middle. S, T .... **C. mallardiae** (*Harv.*) *D.T.*
    2.* Length of articulations equal to or less than the width.
        3. Middle and upper articulations deeply sagittate.
            4. Articulations narrow, with acute points. S, E, NE .... **C. sagittatum** (*Lamour.*) *Aresch.*
            4.* Articulations triangular, with points less acute than in *C. sagittatum*. Reported NE by Bailey. ? Australia .... **C. spectabile** *Harv.*
        3.* Not as above. S, T, E, NE ...... **C. wardii** (*Harv.*) *D.T.*

AMPHIROA Lamour.

Under *Amphiroa anceps* I am including records of *A. nobilis* Kuetz., *A. dilatata* Lamour., *A. galaxauroides* Sond., and probably *A. tasmanica* Sond., following Weber van Bosse & Foslie (1904.)

1. Thallus more or less flattened.
    2. Margins undulate. ? N .... **A. foliacea** *Lamour.*
    2.* Margins not undulate.
        3. Mature node with three calcareous teeth. W, S, E, N, ? T .... **A. anceps** (*Lamour.*) *Decne.*
        3.* Mature node without calcareous teeth. W, S, E .... **A. ephedraea** (*Lamour.*) *Aresch.*

1.* Thallus cylindrical.
    4. Plant very fragile, fragmenting readily. Branching irregularly dichotomous. NE .... **A. fragilissima** (*L.*) *Lamour.*
    4.* Plant not excessively fragile.
        5. Branches diverging at an angle of 45°. Lord Howe Island .... **A. howensis** *Lucas*
        5.* Branches forming acute angles with the axis. W, S, E .... **A. ephedraea** (*Lamour.*) *Aresch.*

RHODOPELTIS Harv.

SYNONYM: *Litharthron* W. v. B.

Only species. W, S .... **R. australis** *Harv.*

METAMASTOPHORA Setch.

The species treated below were formerly recorded as species of *Mastophora* Decne.

1. Underside of thallus not pruinose nor hoary. S, T, E .... **M. canaliculata** (*Harv.*) *Setch.*

1.* Underside of thallus pruinose or hoary.
    2. Frond flat throughout. W, S, NE ...... **M. plana** (*Sond.*) *Setch.*
    2.* Frond interruptedly revolute at the apex and on the margins. The following species appear to be very similar.
        3. Underside of thallus more pruinose; without divaricate lobing of the extremities. W, S, T .... **M. lamourouxii** (*Decne. ex Harv.*) *Setch.*
        3.* Underside of thallus less pruinose; lobing divaricately flabellate. SW to SE .... **M. flabellata** (*Sond.*) *Setch.*

ETHELIA W. v. B.

Only species. Thallus large, broad, undivided, upright. Previously recorded as *Peyssonnelia australis* Sond. W, S, T, N .. **E. australis** (*Sond.*) *W. v. B.*

LIAGORA *Lamour.*

In addition to the species below, *Liagora australasica* Sond. has been recorded from the West.

Under *L. farinosa* I am including Australian records of *L. cheyneana* Harv. and *L. cliftonii* (Harv.) J. Ag.; see Levring (1953).

Under *L. wilsoniana* I am including Australian records of *L. distenta*, *L. orientalis* and *L. pulverulenta;* see Levring (1953).

Under *L. ceranoides* I am including the Australian records of *L. leprosa*; see Levring (1953).

Yamada (1938) regards *L. annulata* J. Ag. and *L. rugosa* Zan. as probably synonymous with *L. caenomyce* Decne.

Under *L. harveyana* I am including Australian records of *L. viscida* (Forssk.) Ag.; see Levring (1953).

1. Cells of assimilatory filaments not moniliform, all of relatively uniform length. W, S .... **L. farinosa** *Lamour.*

1.* Cells of assimilatory filaments moniliform or nearly so; lower cells obviously longer than the upper.

  2. Frond dichotomous, with lateral ramelli.

    3. Lateral branches persistent.

      4. Plant not adhering to paper on drying. Lord Howe Island .... **L. howensis** *Lucas*

      4.* Plant adhering to paper on drying. Branches acute. W, S .... **L. wilsoniana** *Zeh*

    3.* Lateral branches at length deciduous. Branches obtuse. NE .... **L. ceranoides** *Lamour.*

  2.* Frond dichotomous, without lateral ramelli.

    5. Branches and branchlets with clear annulations.

      6. Plant 10-12 cm. long. W .... **L. crassa** *Levr.*

      6.* Plant 3-5 cm. long, imbricate. Norfolk Is. .... **L. caenomyce** *Decne.*

    5.* Not as above. W, S, T .... **L. harveyana** *Zeh*

GALAXAURA Lamour.

G. janioides Lamour., recorded from Australia, was listed as "inquirendo" by de Toni (1897-1905). Svedelius (1945) suggested that the record of *G. conglutinata* Kjellm. should be abandoned since it was based on a "single poor and fragmentary specimen".

Under *G. lapidescens* I am including *G. rudis* Kjellm. and *G. cohaerens* Kjellm. at least in so far as Australian records are concerned; see Lucas (1934) and Levring (1953).

Under *G. arborea* I am including Australian records of *Brachycladia marginata* (Sol.) Schmitz; see Kjellman (1900), Chou (1944) and manuscript notes by Lucas contained in the National Herbarium of New South Wales. *G. pilosula* Kjellm. (recorded from the East) and *G. laxa* Kjellm. (recorded from the South and East) are very closely related to, if not identical with, *G. arborea.*

According to Svedelius (1953), *G. fastigiata* includes Australian records of *G. oblongata* (Ell. & Sol.) Lamour., *G. eburnea* Kjellm. and *G. fragilis* (Lamour.) Kuetz.

Svedelius (1945) considers that *G. collabens* J. Ag. is probably identical with *G. elongata.*

Under *G. umbellata* I am including *G. obtusata* Lamour., *G. dolicharthra* J. Ag. and *G. tumida* Kjellm.; see Chou (1945) and Levring (1953).

The terminology used in this key is that adopted by Chou (1944 and 1945).

1. Plants asexual. Short assimilatory filaments composed of either a tumid basal cell and one or two terminal cells or of stalk and terminal cells.
    2. Plants with branches terete throughout. Branches not over 2 mm. in diameter, villous or hirsute, bearing extended assimilatory filaments. Supporting and tumid basal cells present.
        3. Assimilatory portion homogeneously filamentous, composed only of extended assimilatory filaments. W, N, NE, Lord Howe Island .... **G. lapidescens** (*Ell. & Sol.*) *Lamour.*
        3.* Assimilatory portion heterogeneous, composed of both extended and short assimilatory filaments.
            4. Both extended and short assimilatory filaments arranged in fasciculate manner. N .. **G. fasciculata** *Kjellm. emend. Chou*
            4.* Short and extended assimilatory filaments not fasciculate in arrangement. N .... **G. subfruticulosa** *Chou*
    2.* Plants with branches flattened above, although terete below.
        5. Cortical tissue 20-60μ thick, 1-2-stromatic. Branches continuous, proliferations few. W, S, E, N ...... **G. aborea** *Kjellm.*
        5.* Cortical tissue 60-80μ thick, 2-3-stromatic. W, S **G. spathulata** *Kjellm.*

1.* Plants sexual or cystocarpic. Cortical tissue parenchymatous, composed of a continuous epidermis of chromatophore-bearing cells and a hypodermis of 2-3 layers of cortical cells.
    6. Plants with branches terete throughout. Cortical tissue with or without lobed cells, when present the latter innermost.
        7. Plants glabrous or subglabrous. Cortical tissue parenchymatous or subfilamentous.
            8. Cortical tissue subfilamentous, remaining attached to medullary filaments after decalcification.
                9. Branches slender, commonly 0·5-1·0 mm., seldom more, in diameter. N **G. cylindrica** (*Ell. & Sol.*) *Lamour.*
                9.* Branches coarse, 0·8-2·5 mm., commonly greater than 1 mm., in diameter. E, NE, Lord Howe Is. .... **G. fastigiata** *Decne.*
            8.* Cortical tissue parenchymatous. Nodes constricted.
                10. Segments short, annulate-rugose, seldom more than 5 mm. long, 1-2 mm. in diameter.
                    11. Plant 3-4 cm. long, 1-1·5 mm. in diameter. N .... **G. rugosa** (*Ell. & Sol.*) *Lamour.*
                    11.* Plant longer, up to 15 cm., and more robust. NE, Norfolk Is., ? SW .... **G. elongata** *J. Ag.*
                10.* Segments 0·5-2·5 cm. long, 2-4 mm. in diameter, smooth. S, E, N, Lord Howe Is. .... **G. umbellata** (*Esp.*) *Lamour.*
        7.* Plants hirsute. Cortical tissue trisomatic, with lobed cells present. Extended assimilatory filaments scattered singly, slightly stiff and brittle; epidermal cells 24-44μ in diameter (in surface section). N ...... **G. glabriuscula** *Kjellm. emend. Chou*

6.* Plants with branches flattened above, although terete below. Epidermis smooth, without spinulose cells. Cortical tissue trisomatic, with lobed cells present and intermediate in position. Segments short, commonly not exceeding 1 cm. E .... **G. angustifrons** *Kjellm. emend. Chou*

ACTINOTRICHIA Decne.

Only species. Previously recorded as *A. rigida* (Lamour.) Decne.; see Borgesen (1942). NE .... **A. fragilis** (*Forssk.*) *Borgs.*

EPISPORIUM Moeb.

Only species. W .... **E. centroceratis** *Moeb.*

DICTYURUS Bory

Only species. N .... **D. purpurascens** *Bory*

CATENELLA Grev.

Post (1936) accepts the removal of *C. procera* J. Ag. to *Lomentaria ramsayana*, q.v.

Only species. Previously recorded as *C. opuntia* (Good. & Woodw.) Grev.; see Post (1936). NE, E .... **C. nipae** *Zan.*

GLOIOSACCION Harv.

Only species. It has been recorded previously as *Chrysymenia brownii* (Harv.) J. Ag. W, S, T .... **G. brownii** *Harv.*

BOTRYOCLADIA Kylin

Formerly, species of this genus were recorded under *Chrysymenia*.
Botryocladia leptopoda was formerly known as *Chrysymenia uvaria* var. *leptopoda* J. Ag.

1. Transverse section of balloons with an innermost layer of small cells. Balloons large, over 1 cm. in diameter. W, S, T, E .... **B. obovata** (*Sond.*) *Kylin*

1.* Transverse section of balloons without an innermost layer of small cells. Balloons small, less than 0·5 cm. in diameter. NE .... **B. leptopoda** (*J. Ag.*) *Kylin*

HALODICTYON Zan.

1. Frond simple. S .... **H. velatum** *Reinb.*

1.* Frond branched.

  2. Frond terete. W, S .... **H. australe** *Harv.*

  2.* Frond compressed.

    3. Length of primary articulations equals 2-3 times the breadth. W, S .... **H. robustum** *Harv.*

    3.* Length of primary articulations equals 6 to 8 times the breadth. W, S, T .... **H. arachnoideum** *Harv.*

WEBERVANBOSSEA J. de Toni

Synonym: *Bindera* Harv. 1859, non *Bindera* J. Ag. 1841; see Kylin (1956, p. 329).

The species here placed under *Webervanbossea* were previously recorded in Australia as species of *Bindera.*

According to Kylin (1931) the plant recorded from Victoria as *Bindera ramosa* J. Ag. does not belong to this genus.

Under *Webenvanbossea splachnoides* I am including *Bindera saccata* (Harv.) J. Ag.; see Kylin (1931).

1. Main axis only slightly constricted. Obvious tufts of granular cells arising from inner surface of large cells next to central space of thallus. W, S, T .... **W. splachnoides** (*Harv.*) *J. de Toni*

1.* Main axis manifestly constricted. Tufts of granular cells absent or inconspicuous. S .... **W. kaliformis** (*J. Ag.*) *J. de Toni*

COELARTHRUM Borgs.

The two species below were previously recorded as species of *Erythrocolon* J. Ag.

1. Balloons up to five times as long as broad, not developing tissue within the large cells. Articulations with a definite pedicel. W, S .... **C. muelleri** (*Sond.*) *Borgs.*

1.* Balloons rarely more than 3 times as long as broad, with small cells developed within the layer of large cells. Without a definite pedicel at the articulations. W .... **C. cliftonii** (*Harv.*) *Kylin*

LOMENTARIA Lyngb.

Lomentaria ramsayana, L. monochlamydea, L. corynophora and *L. clavellosa* were previously recorded as species of *Chylocladia.*

L. australis is based on *Chondrothamnion australe* Kuetz. According to Levring (1946) Australian records of *L. clavellosa,* which is a coarser form, should be included under *L. australis.*

1. Branching not pinnate, but usually irregularly dichotomous. E .... **L. ramsayana** (*J. Ag.*) *Kylin*

1.* Branching pinnate.

    2. Branching once pinnate. Thallus wide. S .... **L. monochlamydea** (*J. Ag.*) *Kylin*

    2.* Branching more than once pinnate.

        3. Branching twice pinnate. S ... **L. corynophora** (*J. Ag.*) *Kylin*

        3.* Branching more than twice pinnate. S, E, ? T .... **L. australis** (*Kuetz.*) *Levr.*

CHYLOCLADIA Grev.

Several species previously recorded as *Chylocladia* are now included under *Lomentaria,* q.v. *Chondrosiphon novae-hollandiae* Kuetz., from Australia, is not a *Chylocladia* but may be a species of *Rhabdonia* (see De Toni 1897-1905, p. 583). *C. zostericola* (Harv.) Kylin may be a species of *Champia* (see Kylin 1931).

Chylocladia zostericola was previously recorded as *Gasteroclonium zostericola* (Harv.) J. Ag.

Chylocladia reflexa was previously recorded as *Gasteroclonium reflexum* (Chauv.) Kuetz.

1. Epiphytic on *Cymodocea*. S .... **C. fruticulosa** *Reinb.*

1.* Not epiphytic on *Cymodocea*.

  2. Width of axis uniform. Length of articulations approximately equals the breadth. W .... **C. zostericola** (*Harv.*) *Kylin*

  2.* Width of axis not uniform, tapering towards the base. Length of articulations greater than the breadth.

    3. Branches secund, reflexed. Plant small. ? Australia .. .. **C. reflexa** (*Chauv.*) *Lenorm.*

    3.* Branches opposite, not reflexed. Plant larger. E .... **C. gelidioides** *Harv.*

CHAMPIA Desv.

1. Widths of individual branches differing noticeably. Lateral branches again much divided. Plants large, coarse.

  2. Main axis very much wider than the branches. Articulations not clearly evident in pressed specimens. S, T .. **C. obsoleta** *Harv.*

  2.* Main axis approximating the branches in size. Articulations moderately clearly shown in pressed specimens. Length of articulations varies through the plant.

    3. At the base, the length of the articulations equals or exceeds the breadth. Articulations conspicuous. W, S, T, NE .... **C. affinis** (*Hook. & Harv.*) *J. Ag.*

    3.* At the base the length of the articulations is less than the breadth. Articulations only moderately conspicuous. T .... **C. insignis** *Lucas*

1.* Branch widths moderately uniform. Lateral branches not much divided.

  4. Cortex 1 cell wide. Plant moderate to small in size.

    5. Plant moderate in size, not compressed nor irridescent. W, S, T, E, N .... **C. parvula** (*Ag.*) *Harv.*

    5.* Plant small, compressed, irridescent. Length of articulations less than the breadth. W, S, E, N .... **C. compressa** *Harv.*

  4.* Cortex more than 1 cell wide. Plant large, the branches widely spaced.

    6. Branching verticillate. Cells in cortex numerous. S .. .. **C. verticillata** *J. Ag.*

    6.* Not as above.

      7. Branches opposite. S .... **C. oppositifolia** *J. Ag.*

      7.* Branches irregularly disposed. W, S, T .... **C. tasmanica** *Harv.*

GATTYA Harv.

Only species. W, S .... **G. pinnella** *Harv.*

PTILOCLADIA Sond.

Only species. W, S .... **P. pulchra** *Sond.*

KYLINIA Rosenv.

Only species. S .... **K. australis** *Levr.*

COLACONEMA Batt.

1. Endophytic in *Bonnemaisonia australis.* S ...... **C. bonnemaisoniae** *Batt.*

1.* Not endophytic in *Bonnemaisonia.*

2. Endophytic in *Asparagopsis.* W, S .... **C. americana** *Jao*

2.* Endophytic in *Delisea fimbriata.* T .... **C. deliseae** *Levr.*

ACROCHAETIUM Naeg.

The species below have been previously recorded as species of *Chantransia* (DC.) Schmitz.

1. Entirely endophytic in *Liagora.* S .... **A. collinsianum** *Borgs.*

1.* Epiphytic (the base may be endophytic) or epizoic.

2. Basal portion consisting of a single cell only.

3. Chromatophore stellate; thallus branched. W, S, T, E, N .... **A. catenulatum** *Howe*

3.* Chromatophore parietal; thallus simple. S .... **A. unifilum** *Levr.*

2.* Basal portion not consisting of a single cell only.

4. Basal portion entirely endophytic.

5. Usually growing on *Codium.*

6. Cells with 1-4 pyrenoids, the cell length 3 to 5 times the breadth. S, T, E .... **A. grande** (*Levr.*) *J. de Toni*

6.* Cells with 1 (seldom more) pyrenoids, the cell length 1·5 to 2·5 times the breadth. S, T .... **A. polyrhizum** (*Harv.*) *J. Ag.*

5.* Growing on *Polycerea* or *Scytosiphon.*

7. Growing on *Polycerea.* S .... **A. villiforme** *Levr.*

7.* Growing on *Scytosiphon.* W, T .... **A. botryocarpum** (*Harv.*) *J. Ag.*

4.* Basal portion not entirely endophytic.

8. Basal filaments more or less united to a disc.

9. Thallus less than 300μ long, densely pulvinate. N .... **A. pulvinatum** *Levr.*

9.* Thallus more than 300μ long.

10. Plant simple or with few branches. T .... **A. subsimplex** *Levr.*

10.* Plant moderately branched.

11. Monosporangia seriate on the upper side of the ultimate branches. W, S, E .... **A. radicans** (*Harv.*) *Levr.*

11.* Not as above.

12. Cells 10-12μ thick, 2 to 4 times as long as broad. S, T, E .... **A. daviesii** (*Dillw.*) *Naeg.*

12.* Cells 7-9μ thick, 5 to 8 times as long as broad. W, S, E, N .... **A. thuretii** (*Born.*) *Coll. & Herv.*

8.* Basal filaments not united to a disc.

13. Plant epizoic. N .... **A. effusum** *Levr.*

13.* Plant epiphytic.

14. Cells 5-7μ thick. S .... **A. humile** (*Rosenv.*) *Borgs.*

14.* Cells about 3μ thick. S .... **A. subreductum** *Levr.*

CORYNOSPORA J. Ag.

SYNONYMS: *Neomonospora* Setch. & Gard. 1937; *Monospora* Solier 1845, non *Monospora* Hochsteller 1841. I am accepting the generic epithet *Corynospora* J. Ag. following Kylin (1956, p. 385). New combinations of some species under this genus are effected on p. 351-2.

Lucas (1909) recorded the species treated below under the genus *Monospora*. Australian specimens of *Corynospora griffithsioides* have been recorded under the name *Griffithsia setacea* Harv.; see Lucas (1909).

1. All branches pellucid-articulate, not covered by fibres or branch bases.

2. Plant very fine and elongate, attenuate, gelatinous. W, S, N .... **C. australis** *Harv.*

2.* Not as above.

3. Plant small. Branches terminating in corymb-like tufts. W .... **C. flabelligera** (*Harv.*) *May*

3.* Plant elongate. Branching irregularly dichotomous. S, T .... **C. elongata** (*Harv.*) *May*

1.* Basal branches either covered by anastomising fibres or with numerous branch bases.

4. Plant 2-6 cm. long.

5. Plant usually 2-4 cm. long. W, S ...... **C. gracilis** *Harv.*

5.* Plant usually 4-6 cm. long. T .... **C. arachnoides** *Harv.*

4.* Plant 6-15 cm. long.

6. Plant 6-10 cm. long. S, T .. **C. griffithsioides** (*Sond.*) *May*

6.* Plant 8-15 cm. long. W, S .... **C. licmophora** (*Harv.*) *May*

NOTHOCLADUS Skuja

1. Plant coarse (to 0.75 mm. thick). Branching moderately dense. S .... **N. nodosus** *Skuja*

1.* Plant fine (to 0.35 mm. thick). Branching sparce. T .. **N. tasmanicus** *Skuja*

BATRACHOSPERMUM Roth

Israelson (1942) has shown that *B. dillenii* Bory and *B. dillenii* Sirod. are the same species. This species, previously recorded from Australia, is considered to be synonymous with *B. atrum*; see Lucas (1909). *B. atrum* has not previously been recorded from New South Wales, but there is a specimen of it in the Lucas collection at the National Herbarium of New South Wales collected from Clarence, Blue Mountains, N.S.W., by A. H. S. Lucas, April 1918, determined by H. Skuja who has done so much work on this group of plants.

1. Whorls insignificantly developed, microscopic or nearly so. Plant dioecious. Gonimoblast sharply defined, small, arising wart-like from the upper surface. Plant up to 5 cm. long. T, E, N .... **B. atrum** (*Huds.*) *Harv.*

1.* Whorls strongly developed.

  2. Trichogyne club- or urn-shaped. Gonimoblasts small, usually several to each whorl, all of them on the inner side of the whorl. Plant monocious. Thallus usually annual, without new growths. Monospores absent. Plant up to 10 cm. long. S, T, N .... **B. moniliforme** *Roth*

  2.* Trichogyne cone-shaped. Gonimoblast large, rarely more than one developed in each whorl. Plant up to 12 cm. long, bright green. Monosporangia present. T, N **B. vagum** (*Roth*) *Ag.*

WRANGELIA Ag.

W. confluens J. Ag. and *W. incurva* J. Ag. are invalid names published without description in lists; however Lucas (in notes on specimens) suggests that *W. incurva* J. Ag. may be *Antithamnion mucronatum* (J. Ag.) D.T.

1. Ramuli of the whorls very soft and collapsing readily.

  2. Plant up to 15 cm. long. W, NE .... **W. penicillata** *Ag.*

  2.* Plant over 15 cm. long.

    3. Plant up to 30 cm. long. S, T, E .... **W. plumosa** *Harv.*

    3.* Plant up to 60 cm. long. W, S .... **W. princeps** *Harv.*

1.* Ramuli of the whorls rather rigid.

  4. Ramuli mucronate and with a sharp terminal joint.

    5. Frond clearly ecorticate.

      6. Plant flaccid, slender. W, S .... **W. nitella** *Harv.*

      6.* Plant more harsh. S, T .... **W. mucronata** *Harv.*

    5.* Frond corticate or with a spongy stratum of curving ramelli.

      7. Frond ecorticate but with a spongy stratum. W, S .... **W. myriophylloides** *Harv.*

      7.* Frond normally corticate upwards from the base, without a spongy stratum.

        8. Length of articulations of ramelli 3 to 4 times the breadth. S, W, T .... **W. velutina** *Harv.*

        8.* Length of articulations of ramelli 4 to 5 times the breadth. T .... **W. gunniana** *J. Ag.*

  4.* Apex rather obtuse.

    9. Ramuli of the whorls almost simple. Plant corticate. S, T .... **W. setigera** *Harv.*

    9.* Ramuli of the whorls pinnate and dichotomous.

      10. Frond ecorticate.

11. Branches opposite or verticillate, not spreading. W .... **W. tenella** *Harv.*

11.* Branches pinnate, spreading. T .... **W. jeannerettii** *Hook. & Harv.*

10.* Frond ecorticate but with appressed threads, or corticate.

12. Frond ecorticate but with appressed threads.

13. Joints of ramelli 3 to 4 times longer than broad.

14. Frond sub-dichotomous, the main branches not very imbricate. Plant less than 15 cm. long. Cell wall thin and membranous. W, S .... **W. wattsii** *Harv.*

14.* Frond subpinnately or abundantly branched, very imbricate.

15. Ramelli of the whorls incurved. Cell walls thick and gelatinous. W, S .... **W. crassa** *Harv.*

15.* Ramelli very erect. Plant over 15 cm. long. S, T .... **W. protensa** *Harv.*

13.* Joints of ramelli more than 3 to 4 times longer than broad.

16. Joints of ramelli 10 to 12 times longer than broad. W, S .... **W. halurus** *Harv.*

16.* Joints of ramelli 6 to 8 times longer than broad. W, S, T .... **W. verticillata** *Harv.*

12.* Frond corticate.

17. Wall of imbricate ramelli very dense.

18. Length of articulations of ramelli less than 3 times the breadth. S ...... **W. clavigera** *Harv.*

18.* Length of articulations of ramelli greater than 3 times the breadth. W .. **W. abietina** *Harv.*

17.* Not as above.

19. Young frond branches tomentose. S, T .. .. **W. nobilis** *Harv.*

19.* Young frond branches not tomentose. S, T .... **W. ballioides** *J. Ag.*

CROUANIA J. Ag.

1. Plant corticate or appearing so due to network of ramelli in verticils.

2. Plant up to 10 cm. long, bearing soft verticillate branches. T .... **C. gracilis** *J. Ag.*

2.* Plant up to 15 cm. long, bearing firm verticillate branches which form an intricate network over the main branches. W, S .... **C. vestita** *Harv.*

1.* Plant clearly ecorticate. Branching verticillate.
    3. Plant up to 5 mm. long. Thursday Is. .... **C. minutissima** *Yamada*
    3.* Plant over 5 mm. long. Branches firm, never soft.
        4. Secondary ramelli minute, obtuse. S .... **C. muelleri** *Harv.*
        4.* Ramelli conspicuously attentuated towards the apices. W, S, T, N .... **C. australis** (*Harv.*) *J. Ag.*

DUDRESNAYA Bonnem.

Only species. S .... **D. australis** *J. Ag. in Setch.*

RHODOCHORTON Naeg.

1. Growing on shaded rocks at high tide level. E .... **R. rothii** (*Turt.*) *Naeg.*
1.* Epizoic on hydroids. E .... **R. concrescens** *Drew*

ACROTHAMNION J. Ag.

Only species. Previously recorded as *Callithamnion pulchellum* Harv. W, S .... **A. pulchellum** (*Harv.*) *J. Ag.*

ANTITHAMNION Naeg.

See page 353.

BALLIA Harv.

Dickenson (1949) suggests that *B. hamulosa* J. Ag., recorded from Southern Australia does not belong to this genus.

1. Branching opposite.
    2. Plant bearing ovate, regular, leaf-like pinnae. Final articulations cylindrical, not contracted at the joints. S, T.. **B. robertiana** *Harv.*
    2.* Not as above. Final articulations obovate. W, S, T .... **B. callitricha** (*Ag.*) *Mont.*
1.* Branching not opposite.
    3. Penultimate branching tristichous; branches dissimilar. S .. .. **B. mariana** *Harv.*
    3.* Branching not as above. S, T, E .... **B. scoparia** *Harv.*

GRIFFITHSIA Ag.

See page 353.

BORNETIA Thur.

Bornetia antarctica (Hook. & Harv.) D.T., from Tasmania is regarded as *Griffithsia antarctica* Hook. & Harv., by Levring (1945).

1. Lateral branches somewhat erect. S, T .... **B. meredithiana** *J. Ag.*
1.* Lateral branches less erect. W, S .... **B. binderiana** (*Sond.*) *Zan.*

SPONGOCLONIUM Sond.

Spongoclonium crispulum (Harv.) D.T. and *S. debile* (Harv.) D.T. are considered to be species of *Callithamnion*; see below.

1. Stupose spongiose region of descending radicules forming a large proportion of the plant.

  2. Branches ascending.

    3. Branching imbricate near the apex. S .... **S. fasciculatum** *J. Ag.*

    3.* Branching not imbricate near the apex. S .... **S. dasyurum** (*Harv.*) *J. Ag.*

  2.* Branches spreading.

    4. Plant densely imbricate. S, T .... **S. paradoxum** (*Harv.*) *D.T.*

    4.* Not as above.

      5. Plant large, up to 30 cm. long; pinnules brush-like. W, S .... **S. brounianum** (*Harv.*) *J. Ag.*

      5.* Plant smaller; pinnules feather-like.

        6. Plant fine. S .... **S. wilsonianum** *J. Ag.*

        6.* Plant smaller and less decompound. W, S .... **S. wollastonianum** (*Harv.*) *J. Ag.*

1.* Greater part of frond free and articulate.

  7. Plant spreading, not excessively imbricate.

    8. Hairy coating on base of plant extending well up the secondary branches. Plant up to 25 cm. long. S, T .... **S. latissimum** (*Hook. & Harv.*) *D.T.*

    8.* Hairy coating restricted to the base of the plant. Plant up to 12 cm. long. S, T .... **S. angustatum** (*Hook. & Harv.*) *D.T.*

  7.* Plant with imbricate branches.

    9. Plant small, up to 3 cm. long. W ...... **S. scopula** (*Harv.*) *J. Ag.*

    9.* Plant larger.

      10. Plant up to 8 cm. long. T .... **S. violaceum** (*Harv.*) *D.T.*

      10.* Plant up to 10 cm. long. S, T .... **S. scoparium** *J. Ag.*

CALLITHAMNION Lyngb.

See page 353.

LEJOLISIA Born.

Only species. S .... **L. aegagropila** *J. Ag.*

THAMNOCARPUS Harv.

Thamnocarpus griffithsioides J. Ag., from Southern Australia is a species of *Callithamnion*; see Kylin (1956). *T. pencillatus* includes *T. harveyanus* J. Ag., according to Kylin (1956).

1. Length of articulations of filaments equals twice the diameter. W, S, T .... **T. gunnianus** *Harv.*

1.* Length of articulations of filaments equals 4 to 6 times the diameter. S, T .... **T. pencillatus** (*Harv.*) *J. Ag.*

SPERMOTHAMNION Aresch.

Kylin (1944) includes *S. turneri* (Mert.) Aresch. in *S. repens.*

1. Plant densely and irregularly or dichotomously branched, caespitose, the tufts 2-3 cm. long. W .... **S. cymosum** (*Harv.*) *D.T.*

1.* Branching irregularly pinnate with ramules opposite. T .... **S. repens** (*Dillw.*) *Rosenv.*

CERAMIUM Wigg.

See page 353.

SPYRIDIA Harv.

According to Lucas (1909) records of *Spyridia filamentosa* Harv. in Australia refer to specimens of both *S. spinella* and *S. biannulata.*

Numerous collections by A. H. S. Lucas and by Valerie May extend the hitherto known range of *S. breviarticulata* to include N.S.W. (here recorded as E), e.g. Herb. Valerie May No. 505, Barrenjoey Head, Pittwater side, Palm Beach, near Sydney, N.S.W. 25.2.1945.

1. Primary frond compressed, quadrilateral, distichously branched. S .. .. **S. dasyoides** *Sond.*

1.* Not as above.

  2. Frond compressed, irregularly pinnate at the margin. S .... **S. wilsonis** *J. Ag.*

  2.* Not as above.

    3. Plant robust, rigid, tall, cartilaginous. W ...... **S. prolifera** *Harv.*

    3.* Not as above.

      4. Branching opposite.

        5. Branching verticillate. S .... **S. nobilis** *J. Ag.*

        5.* Branching not verticillate. W, S, T .. **S. opposita** *Harv.*

      4.* Branching not opposite.

        6. Branching subdistichous, pinnate above. S .... **S. squalida** *J. Ag.*

        6.* Branching throughout from all sides.

          7. Base thickened. W, Norfolk Island .. **S. spinella** *Sond.*

          7.* Base not thickened.

            8. Nodes and internodes of equal length. S, T, E, N .... **S. breviarticulata** *J. Ag.*

            8.* Articulations uneven, forming short nodes and long internodes. S, T, E, N .... **S. biannulata** *J. Ag.*

BRACEBRIDGIA J. Ag.

Only species. S .... **B. australis** *J. Ag.*

PLEONOSPORIUM Naeg.

Only species. S, T .... **P. comatum** (*J. Ag.*) *D.T.*

WARRENIA (Harv.) Kuetz.

Only species. T .... **W. comosa** *Harv.*

GULSONIOPSIS Hommersand

Only species. Previously recorded as *Muellerena insignis* (Harv.) D.T. S, T .... **G. insignis** (*Harv.*) *Hommersand*

MUELLERENA Schmitz

Muellerena insignis is now considered under *Gulsoniopsis*, q.v.

1. Final ramulli obtuse. Substance firm. Plant 12-20 cm. long. W, S .... **M. agardhiana** (*Harv.*) *D.T.*

1.* Final ramulli attentuate to mucronate. Substance less cartilaginous. Plant 4-6 cm. long. S .... **M. wattsii** (*Harv.*) *Schmitz*

PTILOTA Ag.

Only species. A doubtful species, according to De Toni (1903). S .... **P. hannafordii** *Harv.*

HALIACANTHA J. Ag.

Only species. S .... **H. incrustans** *J. Ag.*

SEIROSPORA Harv.

Only species. T .... **S. byssoides** (*Arnott*) *D.T.*

LASIOTHALIA Harv.

1. Plant stupose, hirsute on all branches.
    2. Tetraspores secund on the inner side of the plumules. S .... **L. plumigera** (*Harv.*) *D.T.*
    2.* Tetraspores scattered on the sides of the ramelli. W, S, T .. .. **L. hirsuta** *Harv.*

1.* Plant with glabrous rhachis.
    3. Tetraspores sparce, sessile on the inner side of the pinnellae. S .... **L. superbiens** (*Harv.*) *D.T.*
    3.* Tetraspores sessile, solitary on the pinnellae. S .... **L. formosa** (*Harv.*) *D.T.*

PERISCHELIA J. Ag.

Only species. Previously recorded as *Thamnocarpus glomuliferus* J. Ag. W, S .... **P. glomulifera** (*J. Ag.*) *J. Ag.*

CENTROCERAS Kuetz.

The two species below were listed by Lucas (1909) as species of *Ceramium*.

1. Plant 10-17 cm. long, spinose. Length of lower articulations greater than their breadth. W, S, T, E, N .... **C. clavulatum** *Mont.*

1.* Plant 5-12 cm. long, not spinose. Length of cortical articulations not greater than their breadth. S .... **C. cinnabarinum** *J. Ag.*

PTEROCLADIA J. Ag.

Pterocladia pinnata has been previously recorded as *Pterocladia capillacea* (Gmel.) Born. & Thur.; see Papenfuss (1950B).

1. Plant large. Rhizines originating in the cortex, usually near the apex. Cortex frequently granular. Cystocarp openings not obviously rimmed. Holdfast large and branched. W, S, E **P. lucida** (*R. Br.*) *J. Ag.*

1.* Plant small. Rhizines originating in the medulla, usually not very close to the apices. Cortex rarely granular. Cystocarp openings conspicuously rimmed, frequently forward-pointing. Holdfast small and unbranched. W, S, E .... **P. pinnata** (*Huds.*) *Pap.*

GELIDIUM Lamour.

Gelidium asperum (Mert.) Grev. has been recorded from Victoria and Tasmania; I have examined the specimen from Victoria recorded under this name by Levring (1946) and this at least appears to be *G. australe.*

1. Plant large and coarse.
    2. Plant obviously flattened throughout.
        3. Plant without regular distichous pinnules, resembling *Pterocladia lucida.* Lord Howe Is. ...... **G. maidenii** *Lucas*
        3.* Plant with regular distichous pinnules. W, S .... **G. rectangulare** *Lucas*
    2.* Plant usually terete or nearly so for most of its length, large (over 10 cm.). Branches bare or with small glandular proliferations. S, T .... **G. glandulifolium** *Harv.*

1.* Plant fine and small, parts of it sometimes terete.
    4. At least parts of the plant flattened.
        5. Branching loose. Plant larger, resembling *Pterocladia pinnata.* S, T, E, Lord Howe Is. ...... **G. australe** *J. Ag.*
        5.* Branching compact, the base felting. Plant smaller than above. W, S, T, E, N ...... **G. pusillum** (*Stackh.*) *Le Jol.*
    4.* Plant terete.
        6. Plant larger, coarse, the branching always pinnate. E .... **G. caulacantheum** *J. Ag.*
        6.* Plant smaller, usually fine, the branching secund or pinnate. W, S, T, E, N .... **G. pusillum** (*Stackh.*) *Le Jol.*

BECKERELLA Kylin

Only species. Previously recorded as *Pterocladia pectinata* (A. & E. S. Gepp) Lucas and as *Gelidium lucasii* (A. & E. S. Gepp) May. E .... **B. pectinata** (*A. & E. S. Gepp*) *Fan & Pap.*

PTILOPHORA Kuetz.

Only species. Previously recorded as *Gelidium proliferum* Harv. W .... **P. prolifera** (*Harv.*) *J. Ag.*

PLOCAMIUM Lamour.

Plocamium leptophyllum closely resembles or is conspecific with *P. coccineum* (Huds.) Lyngb. Under *P. telfairiae* I am including *P. angustum* (J. Ag.) Hook. & Harv.; see Levring (1945).

The species of this genus do not appear to be clearly differentiated or defined. A revision of the genus is needed.

1. Teeth in threes or more in each alternate secund group.

2. Pinnae wide, up to 3 mm. in diameter, serrate. Sporophylls axile, clustered, each with a single series of tetraspores. W, S, N .... **P. preissianum** *Sond.*

2.* Pinnae narrow, usually not serrate. Sporophylls marginal, branched. Tetraspores usually in two series per sporophyll.

3. Pinnae narrow, rather remote, not serrate. W, S, T, E, N .... **P. leptophyllum** Kuetz.

3.* Pinnae wider, closer, less regular, the lowest pinna sometimes hooked. Reported as being brighter in colour than the above. Axils very rounded. E, N **P. hamatum** *J. Ag.*

1.* Teeth in pairs.

4. Pinnae not serrate.

5. Pinnae wide. Cystocarps pedicellate.

6. Sporophylls fasciculate in the axils. W, S, T .... **P. procerum** (*J. Ag.*) *Harv.*

6.* Sporophylls in a dense globular mass. S, T .... **P. patagiatum** *J. Ag.*

5.* Pinnae narrow. Cystocarps sessile.

7. Sporophylls axile. Rami up to 1 mm. long. S, T, E, N .... **P. telfairiae** *Harv.*

7.* Sporophylls marginal. Rami up to 0·5 mm. long. S, T .... **P. gracile** *J. Ag.*

4.* Pinnae serrate.

8. Pinnae wide.

9. Cystocarps sessile. W, S, T .... **P. costatum** (*J. Ag.*) *Hook. & Harv.*

9.* Cystocarps pedicellate. S, T .... **P. dilatatum** *J. Ag.*

8.* Pinnae narrow. Cystocarps pedicellate.

10. Rami wide. W, S ...... **P. nidificum** (*Harv.*) *J. Ag.*

10.* Rami narrow. W, S, T .... **P. mertensii** (*Grev.*) *Harv.*

PHACELOCARPUS Endl. & Dies.

Phacelocarpus densus Aresch. is not mentioned by Kylin (1932) in his comprehensive studies on the Gigartinales.

Phacelocarpus labillardieri and *P. apodus* do not appear to be clearly differentiated.

1. Frond very densely branched, terete. S .... **P. densus** *Aresch.*

1.* Frond not very densely branched.

 2. Lateral proliferations long. Frond slightly flattened.

  3. Short hairs present on the underside of proliferations. S .... **P. echionotus** *J. Ag.*

  3.* Without short hairs on the underside of the proliferations. Axis very narrowly winged or wingless. S .. **P. sessilis** *Harv.*

 2.* Lateral proliferations short. Frond manifestly flattened.

  4. Axis broadly winged on either side, the wing continuous with the teeth. Length of the teeth approximately equal to the whole width of the rhachis.

   5. Plant fine. Reproductive structures developed at the ends of the proliferations. W, S, T .... **P. complanatus** *Harv.*

   5.* Plant coarser. W, S, T, E .... **P. alatus** *Harv.*

  4.* Axis very narrowly winged or wingless. Length of the teeth greater than the width of the rhachis. Fruit developed in the axils.

   6. Proliferations not extending to the base of the plant. W, S, T, E .. **P. labillardieri** (*Mert.*) *J. Ag.*

   6.* Proliferations extending to the base of the plant. S .... **P. apodus** *J. Ag.*

STENOCLADIA J. Ag.

Stenocladia australis is synonymous with *S. conferta* (Harv.) J. Ag., *S. cliftonii* (J. Ag.) J. Ag., *S. harveyana* J. Ag., *S. corymbosa* J. Ag. and *S. sonderiana* J. Ag.; see Silva (1950, p. 269).

1. Thallus flattened. Filaments numerous. Apices obtuse. W, S ... . **S. australis** (*Sond.*) *Silva*

1.* Thallus not flattened. Filaments not numerous. Apices moderately pointed. S .... **S. furcata** (*Harv.*) *J. Ag.*

ARESCHOUGIA Harv.

Synonym: *Neoareschougia* Kylin.

According to Kylin (1932) *Areschougia stuartii*, *A. intermedia* and *A. australis* may prove to be conspecific, while *A. ligulata* Harv. in J. Ag. is a synonym of *A. australis*. According to Lucas (1909) *Stenocladia ramulosa* J. Ag. is synonymous with *A. dumosa*. *A. laurencia* was incorrectly recorded by J. Agardh as *A. congesta*; see Kylin (1932, p. 37).

1. Thallus manifestly flattened.

 2. Thallus margins serrate, the apices obtuse. Plant large, resembling a coarse, relatively unbranched *Stenocladia australis*. W, S .... **A. australis** *Harv.*

 2.* Thallus margins not serrate, the apices acute.

  3. Plant small, about 10-14 cm. S, T ...... **A. stuartii** *Harv.*

  3.* Plant larger, greater than 15 cm. S .... **A. intermedia** *J. Ag.*

1.* Thallus not manifestly flattened, the apices acute.

 4. Thallus very tufty, much imbricate. W, S ...... **A. dumosa** *Harv.*

 4.* Thallus not tufty, not much imbricate. W, S, T .... **A. laurencia** (*Hook. & Harv.*) *Harv.*

LAURENCIA Lamour.

See page 353.

MICROCLADIA Grev.

Only species. T .... **M. pinnata** *J. Ag.*

BONNEMAISONIA Ag.

Only species. This includes Australian records of *B. asparagoides* J. Ag.; see Levring (1953). S .... **B. australis** *Levr.*

DELISEA Lamour.

Under *Delisea pulchra* I am including *D. fimbriata* (Lamour.) Mont. (see Silva (1957, p. 143)) and *D. serrata* Kuetz.; see Levring (1953, p. 521).

1. Cystocarps solitary or binate, seated in the sinus of the marginal cilia.
    2. Cilia simple. W, S, T .... **D. elegans** (*Ag.*) *Mont.*
    2.* Cilia pectinate. S, T .... **D. hypnoides** *Harv.*

1.* Cystocarps terminal. Plant stouter and deeper in colour. W, S, T, E, N .... **D. pulchra** (*Grev.*) *Mont.*

GELIDIELLA Feldmann & Hamel

Gelidiella acerosa has been recorded as *Gelidium rigidum* (Vahl.) Grev.; see Feldmann and Hamel (1934). *Acrocarpus ramellosus* Kuetz. is a synonym of *Gelidiella ramellosa.*

1. Plant 5-14 cm. long and 500μ or more wide. Branching regularly pinnate or secund. Tetraspores in group at the branch-tips. NE, Norfolk Is. .... **G. acerosa** (*Forssk.*) *Feldmann & Hamel*

1.* Plant smaller. Branching irregular. Plant blackens on drying. Horizontal branches bearing tetraspores at the tips. W .... **G. ramellosa** (*Kuetz.*) *Feldmann & Hamel*

RHODOCALLIS Kuetz.

Only species. S, T .... **R. elegans** *Kuetz.*

CHONDROCOCCUS Kuetz.

SYNONYM: *Desmia* Lyngb. The species of this genus seem to be very closely allied and may prove to be only forms of the one species.

1. Pinnae divaricate, unequal, some short and simple, others long and pinnately divided. S .... **C. squarrosus** *Kuetz.*

1.* Pinnae branching moderately balanced.
    2. Main axis narrow, less flattened than in the species below. N .... **C. kilneri** (*J. Ag.*) *D.T.*
    2.* Main axis broader, more flattened than in *C. kilneri.*
        3. Plant smaller, more slender and more densely branched than in *C. hornemannii.* N .... **C. harveyi** (*J. Ag.*) *D.T.*
        3.* Plant larger, coarser and less densely branched than in *C. harveyi.* W, N, Norfolk Is. .... **C. hornemannii** (*Lyngb.*) *Schmitz*

PSILOTHALIA Schmitz

1. Branching alternate, irregularly decompound, the branches flattened; pinnules inarticulate, transversely striate. Pinnules numerous, alternate, up to 4 mm. long. W, S .... **P. striata** (*Harv.*) *Schmitz*

1.* Branching irregularly pinnate. W, SW .... **P. siliculosa** (*Harv.*) *Schmitz*

EUPTILOTA Kuetz

E. jeannerettii (Harv.) Schmitz has recently been transferred to *Diapse*, q.v.

1. Cortication not complete on the pinnellae.

    2. Upper parts of the pinnellae clearly articulate. W, S, T .... **E. articulata** (*J. Ag.*) *Schmitz*

    2.* Upper parts of the pinnellae corticate almost to the apices. W, S, T .... **E. coralloidea** (*J. Ag.*) *Kuetz.*

1.* Cortication complete on the pinnellae. Margins of plant mucronate-serrate. Lord Howe Is. .... **E. formosissima** (*Mont.*) *Kuetz.*

DIAPSE Kylin

Only species. Formerly recorded as *Euptilota jeannerettii* (Harv.) Schmitz (Syn.: *Ptilota jeannerettii* Harv.); see Lucas (1909) and Kylin (1956). S, T .... **D. ptilota** (*Hook. & Harv.*) *Kylin*

RHODOMELA Ag.

1. Plant large, up to 30 cm. long. Cystocarps produced in the axils. W .... **R. erinacea** *J. Ag.*

1.* Plant small, up to 5 cm. long. Cystocarps produced on the upper branches. W .... **R. preissii** *Sond.*

ERYTHROCLONIUM Sond.

Areschougia sedoides Harv. and *Erythroclonium pyriferum* J. Ag. are synonyms of *E. sedoides*; see Kylin (1932).

1. Plant fine and small. S .... **E. angustatum** *Sond.*

1.* Plant coarser.

    2. Leaf-like appendages developed on all sides; cortex thick. W .... **E. sedoides** (*Harv.*) *Kylin*

    2.* Not as above. Branches developed from the nodes.

        3. Cortex thin. Branches often whorled. Stem rough. W, S, T, N .... **E. muelleri** *Sond.*

        3.* Cortex thick. Branches often opposite. Stem smooth. Plant coarser. W, S, NE .... **E. sonderi** *Harv.*

GULSONIA Harv.

Only species. S, T .... **G. annulata** *Harv.*

ASPARAGOPSIS Mont.

The two species below seem to be closely related and scarcely to be distinguished. Under *Asparagopsis taxiformis* I am including *A. sandfordiana* Harv. and *A. delilei* Mont.; see Borgesen (1942).

1. Main axis bare at the base. Plant larger. Branches less acute, the barbed branchlets present only towards the base of the plant. W, S, NE .... **A. taxiformis** *(Del.) Coll. & Herv.*

1.* Main axis not bare at the base. Plant smaller. Barbed branchlets scattered over all the plant. W, S, T, E, N .... **A. armata** *Harv.*

DASYPHILA Sond.

Only species. W, S, T .... **D. preissii** *Sond.*

DASYPHLOEA Mont.

Only species. S, T .... **D. tasmanica** *Harv.*

SPENCERELLA Darbish.

Only species. W .... **S. australis** *Darbish.*

BOSTRYCHIA Mont.

The species have been revised by Post (1936, 1939) and by Tseng (1942B).

Under *Bostrychia moritziana* I am including the Australian records of *B. wardii* Harv.; see Post (1936). *B. tenuis* Post is a synonym of *B. simpliciuscula*; see Post (1936). Under *B. scorpioides* I am including *B. harveyi* Mont.; see Post (1936). *B. mixta* Hook. & Harv. is synonymous with *B. intricata*; see Post (1936).

1. Two pericentral cells per length of central cell.
    2. Plant ecorticate. No differentiation into long and short branches.
        3. Two last orders of branches monosiphonous. Hapterons consisting of modified branches regularly arranged. S, E, N .... **B. moritziana** *Ag.*
        3.* Two last orders of branches polysiphonous.
            4. Hapterons consisting of modified branches regularly arranged. Length of pericentral cells greater than the breadth. Plant without a trunk base. E, N .... **B. radicans** *Mont.*
            4.* Hapterons consisting of proliferations, irregularly arranged. S, T, E **B. simpliciuscula** *Harv. ex. J. Ag.*
    2.* Plant corticate. Hapterons consisting of proliferations, irregularly arranged.
        5. Long and short shoots differentiated.
            6. Two last orders of branches truly monosiphonous. N .... **B. tenella** *J. Ag.*
            6.* Two last orders of branches polysiphonous except that at the tips there may be up to 15 cells monosiphonous. NE .... **B. binderi** *Harv.*

5.* Long and short shoots not differentiated.

7. Two last orders of branches monosiphonous. E .... **B. flagellifera** *Post*

7.* Two last orders of branches polysiphonous. S, T .... **B. scorpioides** (*Huds.*) *Mont.*

1.* More than two pericentral cells per length of central cell.

8. Three pericentral cells per length of central cell. All branches polysiphonous. Length of pericentral cells less than their breadth. Hapterons consisting of modified branches, regularly arranged. Axis with a trunk at the base. N .. **B. kelanensis** *Grun.*

8.* Four to six pericentral cells per length of central cell. Secondary branches polysiphonous. Hapterons consisting of proliferations, irregularly arranged. No differentiation of long and short branches.

9. Plant ecorticate. S, T, E, N ...... **B. intricata** (*Bory*) *Mont.*

9.* Plant corticate. Australia ...... **B. vaga** *Hook. & Harv.*

ENDOSIPHONIA Zan.

Only species. N .... **E. spinuligera** *Zan.*

TAENIOMA J. Ag.

Only species. W, S, NE .... **T. perpusillum** (*J. Ag.*) *J. Ag.*

SARCOTRICHIA Wom. & Shep.

The following species have been previously recorded as species of *Sarcomenia.*

1. Monosiphonous filaments produced from the anterior flanking cells and the transverse pericentral cells. W, S ...... **S. tenera** (*Harv.*) *Wom. & Shep.*

1.* Monosiphonous filaments produced from the anterior flanking cells only. W, S, T .... **S. dolichocystidea** (*J. Ag.*) *Wom. & Shep.*

PLATYSIPHONIA Borgs.

The following species have previously been recorded as species of *Sarcomenia.* Under *Platysiphonia victoriae* I am including *Sarcomenia dasyoides* Harv.; see Womersley and Shepley (1959).

1. Thallus up to a few cm. long, not or only very slightly corticate. S, T, E, NE .... **P. miniata** (*Ag.*) *Borgs.*

1.* Thallus 6-40 cm. long, heavily corticate below.

2. Branching mostly unilateral from the adaxial surface of the parent branches. S, T .... **P. corymbosa** (*J. Ag.*) *Wom. & Shep.*

2.* Branching more irregular.

3. Branches corticate only near their bases, the plant relatively slender. W, S, T, E .. **P. mutabilis** (*Harv.*) *Borgs.*

3.* Branches corticate upwards to nearer their apices, the plant robust, the stem up to 2 mm. thick near the base.

4. Branches corticate almost to the apices, the branch ends curled, the stichidia corticate. W .... **P. hypneoides** (*Harv.*) *Wom. & Shep.*

4.* Younger branches and stichidia ecorticate. S .... **P. victoriae** (*Harv. ex J. Ag.*) *Wom. & Shep.*

SARCOMENIA Sond.

The species recorded as *Sarcomenia rhizocarpa* Harv., from the West, is probably a species of *Dasya*; see Womersley & Shepley (1959).

Only species. W, S .... **S. delesserioides** *Sond.*

MALACONEMA Wom. & Shep.

Only species. Previously recorded as *Polysiphonia roeana* Harv. W, S .... **M. roeana** (*Harv.*) *Wom. & Shep.*

HOLOTRICHIA Schmitz

Only species. W .... **H. comosa** (*Harv.*) *Schmitz*

LOPHOTHALIA Kuetz.

1. Main axis gradually attenuated; branches alternate, tapering at both ends. Final branches with joints. The two final series of branches whorled with monosiphonous ramuli, i.e. the branches verticillate. S, T .... **L. verticillata** (*Harv.*) *Kuetz.*

1.* Main axis thickest at the middle. Branching alternate, not verticillate. Length of final branch joints equals the breadth. S, T **L. hormoclados** *J. Ag.*

DOXODASYA Schmitz

1. Branching alternate, the major branches with minute bulb-like ramuli densely clothed with pencilled simple ramelli. Transverse section of plant showing 4 large tubes surrounded by the periphery. S, T .... **D. bolbochaete** (*Harv.*) *Falk.*

1.* Branching not alternate, but pinnate.

    2. Plant small and slender. S .... **D. lanuginosa** (*J. Ag.*) *Falk.*

    2.* Plant larger. S .... **D. lenormandiana** (*J. Ag.*) *Schmitz*

MICROPEUCE J. Ag.

Micropeuce sarcocaulon has been previously recorded as *Brongniartella sarcocaulon* (Harv.) Schmitz, and *M. feredayae* as *Brongniartella feredayae* (J. Ag.) Schmitz.

1. Adult frond shows siphons more or less transformed, so that tissue appears more parenchymatous. S .... **M. strobiferum** *J. Ag.*

1.* Pericentral structure shown clearly in most of the plant.

    2. Plant succulent, dendroid, tapering, over 15 cm. long, 2-4 mm. wide. Branching alternate, but not excessive. W, S, T .... **M. sarcocaulon** (*Harv.*) *Kylin*

2.* Plant habit not as above. Branching mainly pinnate, frequent. S, T .... **M. feredayae** (*J. Ag.*) *Kylin*

RHODOLOPHIA Kylin

Only species. Previously recorded as *Brongniartella strobilifera* (J. Ag.) Schmitz. S .... **R. strobilifera** (*J. Ag.*) *Kylin*

THAUMATELLA Kylin

Only species. Previously recorded as *Brongniartella disticha* Falk. S .... **T. disticha** (*Falk.*) *Kylin*

BRONGNIARTELLA Bory

Only species. W, S, T .... **B. australis** (*Ag.*) *Schmitz*

POLYSIPHONIA Grev.

See page 353.

CHAMAETHAMNION Falk.

Only species. W, S .... **C. schizandrum** *Falk.*

WILSONAEA Schmitz

Only species. S .... **W. dictyuroides** (*J. Ag.*) *Schmitz*

EUZONIELLA Falk.

Synonym: *Dasyclonium* J. Ag.; see Silva (1952, p. 291).

1. Ultimate branches usually monosiphonous. Plant soft, slender, with numerous branches. W, S, E .... **E. flaccida** (*Harv.*) *Falk.*

1.* Ultimate branches usually polysiphonous. Plant less flaccid.

    2. Plant of moderate size, delicate, the branching visible under a lens. W, S, T, E .... **E. incisa** (*J. Ag.*) *Falk.*

    2.* Plant large, coarse. Branching clearly visible macroscopically. S, T .... **E. harveyana** (*Decne.*) *Falk.*

DASYA Ag.

See page 353.

GONATOGENIA J. Ag.

Only species. Synonyms: *Maschalostroma scoparium* Schmitz, *M. fastigiatum* Falk.; see Falkenberg (1901) and Kylin (1956). W, S ...... **G. subulata** *J. Ag.*

DASYOPSIS Zan.

Only species. S .... **D. clavigera** *Wom.*

FERNANDOSIPHONIA Levr.

Only species. N .... **F. unilateralis** *Levr.*

HAPLODASYA Falk.

Only species. S .... **H. reinboldii** *Falk.*

DIPTEROSIPHONIA Schmitz & Falk.

1. Thallus prostrate, in transverse section showing 5 siphons. S .... **D. dendritica** (*J. Ag.*) *Falk.*

1.* Primary filaments only prostrate. Transverse section of thallus showing 6-8 siphons. W, S .... **D. prorepens** *J. Ag.*

HERPOSIPHONIA Naeg.

See page 353.

POLYZONIA Suhr.

Only species. Identification dubious. W, S .... **P. elegans** *Suhr.*

LOPHOSIPHONIA Falk.

Lophosiphonia neglecta (Harv.) D.T. and *L. calothrix* (Harv.) D.T., both from the West and South, have been recorded in addition to those below.

L. scopulorum, L. prostrata, L. subadunca and *L. reptabunda* have been recorded previously as species of *Polysiphonia.*

Kylin (1938, p. 22) transferred *Lophosiphonia prostrata* to *Falkenbergiella prostrata* (Harv.) Kylin, but later (1956) he listed *Falkenbergiella* as having only one species, viz. *F. capensis* Kylin.

1. Pericentral cells 4.
    2. Plants with distinct prostrate and erect systems of branching. W, S, E, N .... **L. scopulorum** (*Harv.*) *Wom.*
    2.* Plants wholly prostrate except for the fertile branches, epiphytic on a member of the Zonarieae. W, N .. **L. prostrata** (*Harv.*) *Falk.*

1.* Pericentral cells more than 4.
    3. Pericentral cells 6; rhizoids not cut off from the pericentral cell by a septum. N .... **L. subadunca** (*Kuetz.*) *Falk.*
    3.* Pericentral cells 7 or more.
        4. Pericentral cells usually 10 or more; rhizoids cut off from the pericentral cell by a septum. N .... **L. reptabunda** (*Suhr.*) *Kylin*
        4.* Pericentral cells 7-14; rhizoids not cut off from the pericentral cell by a septum. N .... **L. cristata** *Falk.*

HERPOPTEROS Falk.

Only species. S, T .... **H. fallax** *Falk.*

OPHIDOCLADUS Falk.

Only species. Borgesen (1930) recorded *O. simpliuscula* from Australia, but Falkenberg (1901) and Kylin (1956) regard the Australian species as probably distinct. W .... **O. simpliuscula** (*Crouan*) *Falk.*

HETEROSIPHONIA Mont.

1. Plant almost completely ecorticate.
    2. Transverse section of thallus showing four large pericentral cells surrounding a rather wide central region. Plant minute, up to 1·5 cm. in length. W, S, T .... **H. callithamnion** (*Sond.*) *Falk.*
    2.* Transverse section of thallus showing more than four pericentral cells, but the number variable.
        3. Transverse section shows 10-12 siphons. Plant up to 10 cm. long and covered with short branches. W, S .... **H. wrangelioides** (*Harv.*) *Falk.*
        3.* Transverse section usually shows 5 to 9 siphons.
            4. Branching regularly distichous. Australia **H. cladocarpa** *Falk.*
            4.* Branching not regularly distichous.
                5. Plant only up to 2·5 cm. long. E **H. australis** (*J. Ag.*) *D.T.*
                5.* Plant up to more than 2·5 cm. long.
                    6. Pericentral cells 6-8 in the main branches, as few as 4 in the laterals. Plant up to 5 cm. long. W, S .... **H. microcladioides** (*J. Ag.*) *Falk.*
                    6.* Pericentral cells 6-7. Plant up to 10 cms. long. T .... **H. archeri** (*Harv.*) *D.T.*

1.* Plant more or less corticate.
    7. Plant 25 cm. long or longer.
        8. Transverse section of thallus showing 12 siphons. S .... **H. curdieana** (*Harv.*) *Falk.*
        8.* Transverse section of thallus showing 5-11 siphons.
            9. Pinnae and pinnules end in a fan-like tuft of dichotomous branches. Branches taper conspicuously. W, S, T .... **H. gunniana** (*Harv.*) *Falk.*
            9.* Branching pinnulate. Main and secondary axes very different in width. W, S, T .... **H. muelleri** *Sond.*
    7.* Plant not more than about 12 cm. long.
        10. Pericentral cells 6-7. Branching pinnate. Main axis distinct and coarse. Similar to *H. muelleri*. W, S .... **H. struthiopenna** (*J. Ag.*) *D.T.*
        10.* Pericentral cells 8-12.

11. Main axis simple or only slightly branched. Stichidia linear-lanceolate. W, S, NE ..... **H. multiceps** (*Harv.*) *Falk.*

11.* Main axis more branched, and sub-spongiose to spongiose below. Stichidia lanceolate to ovate.

  12. Frond slightly compressed. Stem and ramuli with 10 siphons. Stichidia ovate to sub-lanceolate. S .. .. **H. guichensis** (*Reinb.*) *D.T.*

  12.* Frond terete; ramuli densely branched and having 8-12 siphons. Stichidia lanceolate. W, S .... **H. crassipes** (*Harv.*) *Falk.*

DIGENIA Ag.

Only species. W, N .... **D. simplex** (*Wulf.*) *Ag.*

APHANOCLADIA Falk.

Only species. E .... **A. delicatula** (*Hook. & Harv.*) *Falk.*

PTEROSIPHONIA Falk.

Only species. W, E .... **P. pennata** (*Roth*) *Falk.*

FALKENBERGIA Schmitz

1. Diameter of rami less than 30μ. Plant attached to other algae, drying red. W, S .... **F. rufolanosa** (*Harv.*) *Schmitz*

1.* Diameter of rami greater than 35μ. Plant often free floating.

  2. Habit dense. Plant attached or free floating, drying brown. S, T .... **F. vagabunda** (*Harv.*) *Falk.*

  2.* Habit less dense. Plant only known as free-floating; drying red. E .... **F. olens** *Lucas*

BRYOCLADIA Schmitz

1. Plant 2-3 cm. long. Transverse section of thallus showing 7-12 pericentral cells. Length of articulations twice the breadth. S .... **B. cervicornis** (*Kuetz.*) *Schmitz*

1.* Plant up to 5 cm. long. Transverse section of thallus showing 16 pericentral cells. Length of articulations 2-3 times the breadth. T .... **B. ericoides** (*Harv.*) *Schmitz*

CARRADORIA Mart.

Only species. Formerly recorded as *Polysiphonia virgata* (Ag.) Spreng. W .... **C. virgata** (*Ag.*) *Kylin*

DIPLOCLADIA Kylin

Only species. Formerly recorded as *Polysiphonia patersonis* Sond., *P. spinosissima* Harv., or *Brongniartella patersonis* (Sond.) D.T.; see Lucas (1909) and Kylin (1956). S, T .... **D. patersonis** (*Sond.*) *Kylin*

LOPHURELLA Schmitz

1. Branches numerous, very spreading. Plant purple-brown. S, T .. .. **L. periclados** (*Sond.*) *Schmitz*
1.* Branches erect. Plant very dark. S ...... **L. hookeriana** (*J. Ag.*) *Falk.*

TOLYPIOCLADIA Schmitz

SYNONYM: *Roschera* Sond.

Only species. N .... **T. glomerulata** (*Ag.*) *W. v. B.*

ECHINOTHAMNION Kylin

The species treated below have been previously recorded as species of *Polysiphonia* Grev.

Under *Echinothamnion mallardiae* I am including also *E. lyallii* (Hook. & Harv.) Kylin; I confirm the remarks of De Toni (1897-1905) in that I am unable, from the descriptions, to distinguish between the two.

1. Short branches overlapping to form a continuous sheath. W, S, T .... **E. mallardiae** (*Harv.*) *Kylin*
1.* Short branches distinctly separated.
    2. Short branches close and dense, suggesting a cone. W, S, T .... **E. hystrix** (*Hook. & Harv.*) *Kylin*
    2.* Short branches separated by longer internodes, in appearance suggesting a bunch of grapes. S, T .... **E. hookeri** (*Harv.*) *Kylin*

LOPHOCLADIA Schmitz

Only species. W, S, N .... **L. harveyi** (*Kuetz.*) *Schmitz*

COELOCLONIUM J. Ag.

1. Frond width moderately constant. S, T .... **C. incrassatum** *J. Ag.*
1.* Frond variable in width, with constrictions.
    2. Cystocarps sessile at the apices of the ramelli. W, S .... **C. opuntioides** (*Harv.*) *J. Ag.*
    2.* Cystocarps sessile along the ramelli.
        3. Plant 7-13 cm. long. W, S, T **C. verticillatum** (*Harv.*) *J. Ag.*
        3.* Plant 2-7 cm. long. W, S .. **C. umbellatum** (*Harv.*) *Reinb.*

DOLICHOSCELIS J. Ag.

The species of *Dolichoscelis* here mentioned have been included in *Coeloclonium* J. Ag. *D. disticha* J. Ag. and *D. clavifera* J. Ag. probably belong to the genus *Chondria*; see Kylin (1956).

Only species. S .... **D. gracilipes** *J. Ag.*

PITYOPHYKOS Pap.

SYNONYM: *Pityopsis* Falk.

Only species. S, T .... **P. tasmanica** (*Sond.*) *Pap.*

CHONDRIA Ag.

See page 353.

ACANTHOPHORA Lamour.

In addition to the species below, *Acanthophora muscoides* (L.) Bory has been recorded from the North.

Lucas (1931A) regarded *A. thierii* Lamour. as synonymous with *A. orientalis* Harv., which has been recorded from Australia; De Toni (1924) included *A. thierii* as a synonym of *A. spicifera*. In consequence I am including the records of *A. orientalis* under *A. spicifera.*

1. Spines regularly arranged on special branches. N, Lord Howe Is. .. .. **A. spicifera** (*Vahl.*) *Borgs.*

1.* Spines more evenly distributed. W, S, E, N .... **A. dendroides** *Harv.*

CHIRACANTHA Falk.

1. Plant up to 25 cm. long, pinnate, drying black. Cystocarps globose. W, S .... **C. valida** (*J. Ag.*) *Falk.*

1.* Plant up to 50 cm. long, dendroid, the ramuli very minute with teeth at the tips, brownish. Cystocarps ovate. S, T .. **C. arborea** (*Harv.*) *Falk.*

TRIGENIA Sond.

1. Branching irregular, not ending in an umbel. Filiform ramenta scattered all over the plant. W, S .... **T. australis** *Sond. & Lehm.*

1.* Branching ends in an umbel. Plant purplish. S .... **T. umbellata** *J. Ag.*

TYLOCOLAX Schmitz

Only species. S .... **T. microcarpus** *Schmitz*

PROTOKUETZINGIA Falk.

Only species. SW, S, T .... **P. australasica** (*Mont.*) *Falk.*

CLADURUS Falk.

Only species. W, S, T .... **C. elatus** (*Sond.*) *Falk.*

HUSSEYELLA Pap.

SYNONYM: *Husseya* J. Ag.

Only species. S .... **H. australis** (*J. Ag.*) *Pap.*

CERATODICTYON Zan.

Only species. N .... **C. spongiosum** *Zan.*

JANCZEWSKIA Solms-Laubach

Only species. S, T .... **J. tasmanica** *Falk.*

GLOIODERMA J. Ag.

Gloioderma speciosum has been previously recorded as *G. tasmanicum* Zan.; see Lucas (1909).

1. Cystocarps on face and margins of frond. W, S, T .... **G. australis** *J. Ag.*
1.* Cystocarps on margins of frond or sub-marginal.
    2. Main axis flattened, the margins crenate.
        3. Frond not much flattened.
            4. Frond up to 6 mm. wide, the branches not very different in width from the main axis. Apices of lower pinnules often hooked. S, T .... **G. speciosum** (*Harv.*) *Wom.*
            4.* Frond up to 8 mm. wide, the branches very different in width from the main axis. W, S .. .. **G. halymenioides** (*Harv.*) *D.T.*
        3.* Frond much flattened, up to 14 mm. wide. S, T .... **G. wilsonis** (*J. Ag.*) *D.T.*
    2.* Thallus terete. S, T .... **G. fruticulosum** (*Harv.*) *D.T.*

ENDOSIRA J. Ag.

Only species. S .... **E. australis** *J. Ag.*

NEOARDISSONIA Kylin

SYNONYM: *Ardissonia* J. Ag.

Only species. S .... **N. naccarioides** (*J. Ag.*) *Kylin*

HELMINTHORA J. Ag.

Only species. Australian material has previously been reported as *H. divaricata* (Ag.) J. Ag.; see Levring (1953). W, S, T .... **H. australis** *J. Ag. ex Levr.*

HELMINTHOCLADIA J. Ag.

Under *Helminthocladia australis* I am including *Helminthora tumens* J. Ag.; see Levring (1953).

1. Main axis percurrent, unbranched. W, S, Lord Howe Is. .... **H. australis** *Harv.*
1.* Main axis irregularly dichotomous. S, T .... **H. densa** (*Harv.*) *Schmitz*

NEMALION Targ.-Tozz.

Only species. According to Levring (1953) *Nemalion helminthoides* Lucas & Perrin is conspecific. S, T, E .... **N. multifidum** (*Weber & Mohr*) *J. Ag.*

NEMASTOMA J. Ag.

1. Plant large (up to 2 metres), relatively little branched, and with numerous lateral proliferations. S .... **N. comosa** *Harv.*

1.* Plant smaller, branched, and with few or no lateral proliferations.

2. Frond cylindrical to compressed; branching irregularly dichotomous. S, T .... **N. feredayae** *Harv.*

2.* Frond membranous, thick, irregularly palmatifid, sub-dichotomous. S, T .... **N. palmata** *Harv.*

GRATELOUPIA Ag.

1. Frond proliferous, but not pinnate.

2. Plant up to 60 cm. long; proliferations regular from the margins. W, T .... **G. prolifera** *J. Ag.*

2.* Plant up to 25 cm. long; proliferations irregular. S, E .... **G. australis** *J. Ag.*

1.* Frond with some pinnate branching.

3. Pinnae narrow-linear, accuminate, the lower longer and pinnately divided, the upper simple. T, E .... **G. filicina** (*Wulf.*) *Ag.*

3.* Pinnae linear to sub-lanceolate.

4. Pinnae sub-lanceolate, acuminate. S .. **G. gigartinoides** *Sond.*

4.* Pinnae linear. T .... **G. dubia** *Zan.*

GLOIOPHLOEA J. Ag.

1. Thallus gelatinous and soft. W, S, T .... **G. scinaioides** *J. Ag.*

1.* Thallus firmer in texture, with denser cortex and thicker sub-cortical zone. S, T .... **G. perriniae** *Levr.*

PSEUDOSCINAIA Setch.

Only species. Probably includes Australian records of *Scinaia furcellata* (Turn.) Bivona; see Setchell (1914). S, T, E .... **P. australis** *Setch.*

SCINAIA Bivona

1. Branches regularly constricted. S, E .... **S. moniliformis** *J. Ag.*

1.* Branches not regularly constricted. N .... **S. moretonensis** *Levr.*

ACROTYLUS J. Ag.

Only species. W, S, T, E .... **A. australis** *J. Ag.*

SARCONEMA Zan.

Sarconema filiforme has been previously recorded as *Dicranema filiforme* Sond.

1. Plant width relatively uniform; sinus of axil acute. .. W, S, T, E, N .... **S. filiforme** (*Sond.*) *Kylin*

1.* Plant width decreasing towards the apices; sinus of axil rounded. N .... **S. furcellatum** *Zan.*

DICRANEMA Sond.

D. setaceum Sond. is not mentioned by Kylin (1932) in his studies on the Gigartinales.

1. Plant much imbricate.
    2. Apices revolute. Plant small. W, S .... **D. revolutum** (*Ag.*) *J. Ag.*
    2.* Apices not revolute. Plant large. W, S ...... **D. grevillei** *Sond.*

1.* Plant less imbricate. E, N .... **D. setaceum** *Sond.*

ERYTHRONEMA J. Ag.

Only species. S .... **E. ceramioides** *J. Ag.*

HYMENOCLADIA J. Ag.

Hymenocladia linearis Sond., from the South, was not considered by Kylin (1931) in his comprehensive studies on the Rhodymeniales, nor by De Toni (1897-1905 and 1924) in his compilations. Similarly *H. husseyana* (J. Ag.) D.T., from the South, was not mentioned by Kylin (1931). *H. ceratoclada* J. Ag. has been recorded from the South, but Kylin (1931) indicates that, from the sterile specimen available, it is difficult to be sure of its taxonomic position.

1. Thallus cylindrical or nearly so, though the main axis sometimes flat.
    2. Main axis manifestly flattened, but the other branches mostly terete.
        3. Plant coarse, not abundantly branched. Main axis very conspicuously flattened. W, S .... **H. ramalina** (*Harv.*) *J. Ag.*
        3.* Plant finer, more abundantly branched. Main axis less flattened. W, S, N .... **H. gracilarioides** *J. Ag.*
    2.* Main axis not manifestly flattened.
        4. Base of plant with branches. S .... **H. ceratoclada** *J. Ag.*
        4.* Base of plant without branches.
            5. Branches more or less flattened. W, S .... **H. dactyloides** (*Sond.*) *J. Ag.*
            5.* Branches wholly terete.
                6. Plant large. W, S .... **H. filiformis** *J. Ag.*
                6.* Plant small, perhaps scarcely distinct from the above. W, S .... **H. subulosa** *J. Ag.*

1.* Thallus wholly flattened.
    7. Thallus resembling one or more leaves. Large cells only in the medulla.
        8. Margins with numerous small proliferations. W, S .... **H. conspersa** (*Harv.*) *J. Ag.*
        8.* Margins mainly smooth. W, S, T .. **H. polymorpha** (*Harv.*) *J. Ag.*

7.* Thallus pinnate with numerous branches from the main axis.

9. Plant coarse, large, widely and irregularly branched. W, S, E .... **H. usnea** (*R. Br.*) *J. Ag.*

9.* Plant finer, smaller, more pinnately branched. W, S .... **H. divaricata** (*R. Br.*) *Harv.*

EUCHEUMA J. Ag.

Euchema muricatum has also been recorded as *E. spinosum* (L.) J. Ag.; see Kylin (1956).

1. Central tissue compact, wholly composed of small elongated cells.

2. Branches borne in whorls at the nodes, often in fours. Short nodular branches frequent. W, N, Lord Howe Is. .... **E. muricatum** (*Gmel.*) *W. v. B.*

2.* Not as above.

3. Branch much constricted at its insertion. W, S, T .. .. **E. speciosum** (*Sond.*) *J. Ag.*

3.* Branch not much constricted at its insertion; branching frequently distichous. W, N .. **E. gelatinae** (*Esp.*) *J. Ag.*

1.* Central tissue of cells of very unequal size, never entirely of small elongated cells. N .... **E. cervicorne** *W. v. B.*

NIZYMENIA Sond.

Only species. W, S, T .... **N. australis** *Sond.*

THYSANOCLADIA Endl.

SYNONYM: *Callophycus* Trev.

Thysanocladia densa Sond., from Northern Australia, is not mentioned by Kylin (1932) in his comprehensive studies on the Gigartinales.

T. dorsifera appears to be very closely related to *T. laxa* and *T. coriacea*. Under *T. oppositifolia* I am including *T. angustifolia* J. Ag.; see Kylin (1932).

1. Whole of plant manifestly flattened.

2. Final pinnae moderately large. Plant dull purple. W, S .... **T. harveyana** *J. Ag.*

2.* Final pinnae much finer than those of preceding orders.

3. Main axis persistent and conspicuous. W ...... **T. costata** *Harv.*

3.* Main axis not very persistant.

4. Margins of branch smooth between the large proliferations.

5. Plant foliose. W .... **T. coriacea** (*Sond.*) *Harv.*

5.* Plant not foliose. S, E, N .... **T. laxa** *Sond.*

4.* Margins of branch serrate. W ...... **T. dorsifera** (*Ag.*) *Endl.*

1.* Upper part of plant always terete, the lower part terete or flattened and quite bare of "leaves". Final pinnae opposite. W, S, T .... **T. oppositifolia** (*Ag.*) *J. Ag.*

MYCHODEA Harv.

Mychodea gracilaria (Sond.) D.T. from Southern Australia (also perhaps recorded as *Endogenia gracilaria* J. Ag.; see De Toni (1924, p. 208)), *M. zanardinii* D.T. and Levi (from Lord Howe Island), and *M. linearis* J. Ag. and *M. longipes* (Kuetz.) J. Ag. (both from Southern Australia) have been recorded but are inadequately known and, except for the last named, were not mentioned by Kylin (1932) in his comprehensive studies on the Gigartinales.

Under *M. hamata* I am including *M. obtusangulata* J. Ag.; see Kylin (1932).

1. Lateral branches distinctively shorter than the axis upon which they are borne.

2. Lateral branches flattened, moderately large or foliose.

3. Branches foliose. S .... **M. foliosa** (*Harv.*) *J. Ag.*

3.* Branches not foliose, frequent, regularly arranged.

4. Lateral branches only slightly compressed. S .... **M. compressa** *Harv.*

4.* Lateral branches distinctly compressed. S, T **M. disticha** *Harv.*

2.* Lateral branches nearly terete and very fine.

5. Branching imbricate. Lord Howe Is. .. **M. halymenioides** *Zan.*

5.* Branching sparse. W, S .... **M. ramulosa** *J. Ag.*

1.* Lateral branches not differing greatly from the axis.

6. Thallus flat, dark and obviously pinnate. S ...... **M. nigrescens** *Harv.*

6.* Thallus not flat, dark and obviously pinnate.

7. Branching much more frequent towards the ends of the branches.

8. Plant greater than 5 cm. S .... **M. spinulifera** *J. Ag.*

8.* Plant up to 3 cm. S .... **M. fastigiata** (*Harv.*) *J. Ag.*

7.* Branching moderately evenly distributed.

9. Plant fine, epiphytic. S .... **M. pusilla** (*Harv.*) *J. Ag.*

9.* Plant much larger, not epiphytic.

10. Branches sometimes hooked. S, T, E .. **M. hamata** *Harv.*

10.* Branches not hooked.

11. Plant with spine-like branches. W, S, T .... **M. carnosa** *Harv.*

11.* Branches not spine like. ......

12. Cystocarps terminal. S, T **M. terminalis** *Harv.*

12.* Cystocarps not terminal. W, S, T .... **M. membranacea** *Harv.*

ECTOCLINIUM J. Ag.

1. Final branches much finer than those preceding. S, T .. **E. dentatum** *J. Ag.*

1.* Final branches not much finer than those preceding. S .. **E. latifrons** *J. Ag.*

THAMNOCLONIUM Kuetz.

Thamnoclonium tissotii W. v. B. has been recorded from North Eastern Australia, but is inadequately known.

1. Frond terete to subterete. Fertile phyllodia in rose-like tufts.

- 2. Branches verrucose all over; branching decompound-dichotomous, fastigiate. S, T .... **T. claviferum** *J. Ag.*
- 2.* Branches verrucose with interspersed bare areas. S .... **T. codioides** *J. Ag.*

1.* Frond flattened.

- 3. Branching dichotomous to sub-flabellate.
  - 4. Plant up to 10 cm. long, the surface verrucose but leaving clear interspersed spaces. S, E ...... **T. dichotomum** *J. Ag.*
  - 4.* Plant up to 25 cm. long, its surface irregularly verrucose. W, S .... **T. proliferum** *Sond.*
- 3.* Branching pinnate, the branches with mid-ribs.
  - 5. Plant up to 7 cm. long. E, N .... **T. seminerve** *J. Ag.*
  - 5.* Plant over 7 cm. long. Phyllodia 8-15 cm. long. W .... **T. lemannianum** *Harv.*

RHABDONIA Harv.

Rhabdonia umbellata Zan. from Tasmania, *R. hamata* Zan. from Southern Australia and *R. patens* Harv. from Western Australia were not mentioned by Kylin (1932) in his comprehensive studies on the Gigartinales.

According to Kylin (1932) the plants recorded as *R. globifera* (Lamour.) J. Ag. from Western Australia and *R. racemosa* J. Ag. from Southern Australia do not belong to the genus *Rhabdonia.*

1. Plant black, its habit as in *R. coccinea* Harv. S, T, E .. **R. nigrescens** *Harv.*

1.* Plant not black.

- 2. Branching not verticillate.
  - 3. Main axis very much coarser than the branches. Cortex consisting of more than 3 layers of cells, those of the inner layer the largest. W, S, T .... **R. dendroides** *Harv.*
  - 3.* Main axis not very much coarser than the branches. Cortex consisting of 3 layers of cells. Plant light red. W, S, T .... **R. coccinea** *Harv.*
- 2.* Branching mainly verticillate from the nodes.
  - 4. Branches bearing spines. Cortex consisting of 1 layer of cells. W, S .... **R. charoides** *Harv.*
  - 4.* Branches not bearing spines.
    - 5. Final branches short. Cortex consisting of more than 3 layers of cells. S, T .... **R. verticillata** *Harv.*
    - 5.* Final branches not very short. Branches mostly constricted at the nodes. S .... **R. clavigera** *J. Ag.*

SOLIERIA J. Ag.

The species below were formerly placed under the genus *Rhabdonia. Solieria chordalis* (Ag.) J. Ag. has also been recorded from the East and North, but is inadequately known.

1. Frond fine, tapered. S .... **S. mollis** (*Harv.*) *Kylin*

1.* Frond coarser, less tapered.

- 2. Plant flattened. T .... **S. compressa** (*J. Ag.*) *Kylin*
- 2.* Plant not flattened. W, S, T, E, N .... **S. robusta** (*Grev.*) *Kylin*

GELIDIOPSIS Schmitz

1. Thallus compressed in the upper portions. Apices fine. Branching dichotomous-decompound. N .... **G. acrocarpa** (*Harv.*) *Schmitz*

1.* Thallus terete, with numerous branches, irregularly branched. N .. .. **G. intricata** (*Ag.*) *Vickers*

GIGARTINA Stackh.

See page 353.

NEMATOPHORA J. Ag.

Only species. Perhaps allied to *Endogenia gracilaria* J. Ag.; see Kylin (1956). Australia .... **N. australis** *J. Ag.*

CORYNECLADIA J. Ag.

Levring (1941) has treated *C. clavata* (Sond.) Ag. as a species of *Laurencia.*

Only species. W, S .... **C. umbellata** J. *Ag.*

BINDERELLA Schmitz

Only species. W, S .... **B. neglecta** *Schmitz*

MELANTHALIA Mont.

Melanthalia abscissa (Turn.) Hook. & Harv. should probably be included under *M. obtusata*; see Kylin (1932).

1. Branches widening at the apices. E .... **M. polydactylis** *J. Ag.*

1.* Branches not widening at the apices; branching regularly dichotomous.

    2. Plant definitely flattened, with branches originating at or near the base and showing traces of a midrib. S, T, E .... **M. obtusata** (*Labill.*) *J. Ag.*

    2.* Plant almost terete, plant small. S .. **M. concinna** (*Turn.*) *J. Ag.*

TREMATOCARPUS Kuetz.

Only species. T .... **T. concinnus** (*R. Br.*) *J. Ag.*

CORALLOPSIS Grev.

Corallopsis umbellifera Zan. has been recorded from Southern Australia, but little is known of this species; all other species of this genus are from tropical waters. *C. cereus* (J. Ag.) F. Muell. has been recorded from Northern Australia by Bailey (1913), but I have no further information regarding this species.

C. salicornia has been recorded as *Gracilaria salicornia* (Ag.) Dawson; see Cribb (1961).

1. Upper branches spinose. Plant thick and coarse. N .... **C. urvillei** (*Mont.*) *J. Ag.*

1.* Upper branches not spinose. Main axes branched and very little, if at all, attenuated at the base.

2. Branchlets constricted at the base, arising either at the apices of other branches or adventitiously. N .... **C. cacalia** *J. Ag.*

2.* Branchlets very constricted at the base and arising at the apices of other branches.

  3. Plant about 10 cm. long. N .... **C. salicornia** *Ag.*

  3.* Plant about 5 cm. long. N ...... **C. minor** (*Sond.*) *J. Ag.*

CORDYLECLADIA J. Ag.

Only species. S .... **C. furcellata** (*Harv.*) *J. Ag.*

GRACILARIA Grev.

For discussion of *Gracilaria aculeolata* Aresch., *G. corniculata* (R. Br.) J. Ag. and *G. fruticosa* Harv., see May (1948B). *G. edulis* has been previously recorded as *G. lichenoides* (L. ex Turn.) Harv.; see Silva (1952). Latter species (May, 1948B) includes *G. taenioides* J. Ag., *G. spinescens* (Kuetz.) J. Ag., *G. lucasii* A. & E. S. Gepp, *G. lemania* (Kuetz.) Sond., *G. polyclada* Sond. and *G. coronopifolia* J. Ag.

I am including *G. ramulosa* J. Ag. under *G. furcellata* Harv.; see May (1948B).

1. Thallus in transverse section showing sudden transition from small peripheral to larger central cells.

  2. Habit indefinite; thallus terete. W, S, T, E, N .... **G. confervoides** (*L.*) *Grev.*

  2.* Habit tufty† to half-tufty; thallus sometimes flattened.

    3. Elongated proliferations (other than branches) produced from the margins of a flattened thallus. W .... **G. pannosa** (*Harv.*) *J. Ag.*

    3.* Elongated proliferations (other than branches) not produced.

      4. Thallus in transverse section usually with three large central cells across any one diameter; thallus almost invariably flattened. E, N .... **G. textorii** (*Suring.*) *D.T.*

      4.* Thallus in transverse section with six or more large central cells in any one diameter; plant usually terete, tufty, rarely exceeding 2 mm. in width.

        5. Thallus usually less than 1·5 mm. in width, sometimes flattened. E, N, Lord Howe Is., Norfolk Is. .... **G. edulis** (*Gmel.*) *Silva*

        5.* Thallus about 2 mm. in width, terete. Lord Howe Is. .... **G. howensis** *Lucas*

1.* Thallus in transverse section showing gradation in size of cells from centre to periphery.

  6. Dried plant bearing papillose-rugose proliferations; plant coarse. N .... **G. canaliculata** (*Kuetz.*) *Sond.*

  6.* Dried plant not bearing papillose-rugose proliferations.

    7. Branching dichotomous and imbricate; plant tufty; width of branch often increasing greatly toward the base. W, S, T .. .. **G. furcellata** *Harv.*

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† Denoting a relatively compact habit, with imbricate branches.

7.* Branching irregular or secund, distichous or trichotomous, not dichotomous, less imbricate; plant tufty or of indefinite habit.

8. Branching usually secund, but sometimes distichous or irregular, somewhat imbricate; width of branch relatively uniform. Habit tufty to half-tufty. W, S, T, E, Lord Howe Is. .... **G. secundata** *Harv.*

8.* Branching irregularly alternate, not imbricate; width of branch increasing greatly toward the base. Habit half-tufty. W, S, T .... **G. harveyana** *J. Ag.*

HERINGIA J. Ag.

Only species. W, S .... **H. filiformis** *Harv.*

RHODODACTYLIS J. Ag.

1. Main branches bulbous at the base. S, T .... **R. bulbosa** (*Harv.*) *J. Ag.*

1.* Not as above. W, S .... **R. rubra** (*Harv.*) *J. Ag.*

HYPNEA Lamour.

The genus is greatly in need of revision. *Hypnea rugulosa* Mont., from the North East, is inadequately known. *H. valentiae* includes *H. cornuta* (Lamour.) J. Ag. according to Yendo (1917) quoted by Tanaka (1941); it probably also includes *H. hamulosa* (Turn.) Mont., *H. charoides* Lamour. (which is synonymous with *H. seticulosa* J. Ag.; see Borgesen (1943)) and *H. divaricata* (Turn.) Grev. (see Hauck, 1887, quoted by Tanaka, 1941). *H. nidifica* seems to be very similar to *H. valentiae.*

1. Plant of relatively compact habit, with imbricate branches.

2. Plant very fine, spinous. Australia .... **H. esperi** *Bory*

2.* Not as above.

3. Branches smooth, flattening on drying. Tetraspores originating on one side of the branch. N .... **H. pannosa** *J. Ag.*

3.* Branches wiry, dense. Tetraspores originating all around the branch. W, T, E, N .... **H. cenomyce** *J. Ag.*

1.* Habit sprawling.

4. Apices hooked.

5. Branch often secund. W, T, E .. **H. musciformis** (*Wulf.*) *Lamour.*

5.* Branches not secund. W, S, T .... **H. episcopalis** *Hook. & Harv.*

4.* Apices usually not hooked.

6. Axis very wide. W, S .... **H. valida** *J. Ag.*

6.* Axis not very wide.

7. Plant covered with short branchlets giving it a hairy appearance.

8. Branchlets numerous. Main axis not remaining persistent and distinct. W, N ...... **H. cervicornis** *J. Ag.*

8.* Branches moderate in number. Main axis persistent. W, S, T, E, N .... **H. valentiae** (*Turn.*) *Mont.*

7.* Plant without short branchlets. Persistant main axis present. N .... **H. nidifica** *J. Ag.*

MERRIFIELDIA J. Ag.

Only species. W, S .... **M. ramentacea** (*Ag.*) *J. Ag.*

GYMNOGONGRUS Mart.

Gymnogongrus assimilis (Sond.) F. Muell. has been recorded from the North East, but is inadequately known.

1. Branching dichotomous-fastigiate. Apices acute. T, E **C. fastigiatus** *Harv.*

1.* Branching irregularly pinnate. Apices obtuse. Lord Howe Is. .... **G. irregularis** *Zan.*

CODIOPHYLLUM Gray

1. Frond decumbent. at least when young.
    2. Frond thick, the surface rugose. W, S .... **C. squamarioides** (*J. Ag.*) *D.T.*
    2.* Frond thinner, smoother than in the preceding species. W .. .. **C. bunburyense** (*J. Ag.*) *Schmitz*

1.* Frond erect.
    3. Network of filiform ramelli very dense.
        4. Plant up to 13 cm. long, mainly terete. W .... **C. decipiens** (*J. Ag.*) *Schmitz*
        4.* Plant up to 20 cm. long, much of it compressed. W, S .... **C. marchesettioides** (*J. Ag.*) *Schmitz*
    3.* Mesh of network of filiform ramelli more open.
        5. Frond funnel-shaped. W ...... **C. spongioides** (*J. Ag.*) *D.T.*
        5.* Frond flattened, complanate. W .... **C. flabelliforme** (*Sond.*) *Schmitz*

THURETIA Decne.

1. Network of anastomising ramelli flattened. W, S .. **T. quercifolia** *Decne.*

1.* Network of anastomising ramelli compressed-terete. W, S .. **T. teres** *Harv.*

ECHINOSPORANGIUM Kylin

Echinosporangium semipennatum has been previously recorded as *Cliftonaea semipennata* (Lamour.) J. Ag.

1. Serrations present on the lower side of the leaflet. S .... **E. semipennatum** (*Lamour.*) *Kylin*

1.* Serrations present on the upper side of the leaflet. S .... **E. imbricatum** (*J. Ag.*) *Kylin*

CLIFTONAEA Harv.

Only species. W, S .... **C. pectinata** *Harv.*

VANVOORTSIA Harv.

Only species. Formerly recorded as *Sonderia bennettiana* (Harv.) F. Muell. E .... **V. bennettiana** (*Harv.*) *Pap.*

CLAUDEA Lamour.

Only species. W, S, T .... **C. elegans** *Lamour.*

CALOGLOSSA Harv.

Post (1936) includes previous Australian records of *Caloglossa beccarii* and *C. mnioides* under *C. leprieurii.*

1. Nodes constricted, at least sometimes. Branching pseudodichotomous. Cell size relatively constant whether viewed in transverse or longitudinal section. All branches equally developed. Length of axile cell equalling its breadth. Pericentral cells about 7. S, T, E, N .... **C. leprieurii** *Mont.*

1.* Nodes not constricted. Branching not dichotomous.

  2. Branching monopodial, alternate. Cell size manifestly different in transverse and longitudinal section. Length of central axile cell less than its breadth. Length of young internodes equal to their breadth. Pericentral cells usually 4. N ...... **C. adnata** *Zan.*

  2.* Branching sympodial. Articulations with 1 to 2 lateral branches. Length of axile cell greater than its breadth. Length of young internodes three times their breadth. Pericentral cells about 9. E, N .... **C. bombayensis** *Borgs.*

DICTYMENIA Grev.

1. Pinnellae conspicuous and uneven in shape. Pinnae narrow-linear. Thallus membranous. W, S .... **D. angusta** *J. Ag.*

1.* Pinnellae not conspicuously uneven in shape.

  2. Frond gelatinous to soft. Stichidia arising from the margins.

    3. Final frond divisions a fascicle of branchlets. W, S, T .... **D. harveyana** *Sond.*

    3.* Final frond divisions foliose, linear, toothed. W, S .... **D. interstincta** *J. Ag.*

  2.* Frond rigid, not gelatinous.

    4. Teeth at margin of frond simple. Plant bipinnate. T .... **D. myriacantha** *Kuetz.*

    4.* Marginal teeth irregular and divided, or regular and usually trifid.

      5. Margin irregularly toothed. Plant slender. Pinnellae narrow-spinose. W, S .... **D. spinulosa** *Kuetz.*

5.* Margins bearing 2- to 6-fid, usually 3-fid, teeth.
  6. Stichidia developed from the lateral veins or midrib. Plant up to 50 cm. long with a tough base; midrib present throughout the plant. W .... **D. sonderi** *Harv.*
  6.* Stichidia developed from the marginal teeth. Plant up to 50 cm. long. Midrib not present throughout the plant. W, S, N .... **D. tridens** (*Mert.*) *Grev.*

KUETZINGIA Sond.

1. Branching pectinate with very fine ultimate divisions. W .... **K. pectinella** (*Harv.*) *Falk.*

1.* Branching not as above.
  2. Pinnae channelled. Midrib more or less obvious in the upper part of the plant. W .... **K. canaliculata** (*Grev.*) *Sond.*
  2.* Pinnae not channelled. Plant narrower and finer than the above species and the midrib less obvious in the upper part of the plant. W .... **K. angusta** *Harv.*

SONDERELLA *Schmitz*

Only species. S, T .... **S. linearis** (*Harv.*) *Schmitz*

AMANSIA Lamour.

1. Branches clearly arising from the midrib or margins.
  2. Branches arising from the midrib. E, N .. **A. dietrichiana** *Grun.*
  2.* Branches arising from the margins.
    3. Pinnae about 2·5 cm. long. S, E, N .... **A. daemelii** (*Sond.*) *J. Ag.*
    3.* Pinnae less than 1 cm. long. NE **A. pumila** (*Sond.*) *J. Ag.*

1.* Plant decompound or sub-dichotomously pinnate.
  4. Branching sub-dichotomously pinnate. Australia .... **A. mammillaris** *Lamour.*
  4.* Branching decompound, laciniate or pinnate.
    5. Margins entire. Pinnae narrow-linear. SW .... **A. pinnatifida** *Harv.*
    5.* Margins serrate.
      6. Pinnae narrow, membranous. W, S .... **A. kuetzingioides** *Harv.*
      6.* Pinnae lanceolate. N, Lord Howe Is. .... **A. glomerata** *Ag.*

LENORMANDIA Sond.

1. Plant a series of " stolons " with " leaves ". E **L. coronata** *Lind. & Setch.*

1.* Plant not as above.

2. Proliferations not arising only from the stem or midrib.
    3. Proliferations arising only from the margins or, in older parts, also from the disc. S, T .... **L. marginata** *Hook. & Harv.*
    3.* Proliferations arising from the margins or from the main costa. S .... **L. pardalis** *J. Ag.*
2.* Proliferations arising from the stem or midrib only.
    4. Proliferations relatively narrow, up to 6 mm. wide.
        5. Proliferations asperate on both sides, bearing minute lanceolate ramuli up to 2 mm. in length with involute tips. S, T .... **L. smithiae** (*Hook. & Harv.*) *Falk.*
        5.* Proliferations not asperate as above, but surface appearing opaque (not glossy) and as if transversely striate. S, T .. .. **L. prolifera** (*Ag.*) *J. Ag.*
    4.* Proliferations wide, over 6 mm.
        6. Plant small, up to 12 cm. long. S ...... **L. chauvinii** *Harv.*
        6.* Plant large, up to 60 cm. or even more.
            7. Phyllodia ovate when young, lanceolate-linear when older. W, S .... **L. hypoglossa** *J. Ag.*
            7.* Phyllodia tapering towards the base.
                8. Ribs more developed. Plant more caulescent. W, S .... **L. muelleri** *Sond.*
                8.* Ribs less developed. Plant less caulescent. W, S, NE .... **L. spectabilis** *Sond.*

ANEURIA W. v. B.

1. Frond simple. W, S .... **A. latifolia** (*Harv.*) *J. Ag.*
1.* Frond sub-dichotomously branched. N .... **A. lorentzii** *W. v. B.*

ENANTIOCLADIA Falk.

1. Stichidia developed in the axils of the branches. W, S .. **E. axillaris** *Falk.*
1.* Stichidia developed in prolongations of the teeth bordering the ramuli. Norfolk Is., Lord Howe Is. .... **E. robinsonii** (*J. Ag.*) *Falk.*

RYTIPHLOEA Ag.

The species recorded under this genus have been so inadequately described that their differentiation presents some difficulty. It is even possible that some of them should be referred to other genera. The record of *Rhytiphloea umbellifera* J. Ag. is only doubtfully from Australia; it seems to be larger (over 30 cm.) than the other species recorded from this country.

1. Pericentral cells arranged in a double series. W...... **R. merrifieldia** *J. Ag.*
1.* Not as above.
    2. Main stem compressed. W .... **R. compressa** *J. Ag.*
    2.* Main stem not compressed. W .... **R. aculeata** *Ag.*

OSMUNDARIA Lamour.

1. Stichidia unbranched, in tufts crowning the apices of the phyllodia. W, S .... **O. prolifera** *Lamour.*

1.* Branched tufts of stichidia arising from the lamina of the phyllodia. Plant narrower than *O. prolifera*. W .... **O. intermedia** (*J. Ag.*) *D.T.*

VIDALIA Lamour.

1. Plant small, up to 1·5 cm. long. W, S .... **V. gregaria** *Falk.*

1.* Plant larger, 6-25 cm. long.

    2. Plant twisted.

        3. Plant 20-22 cms. long, fimbriate. Tetraspores formed on marginal teeth. N .... **V. fimbriata** (*R. Br.*) *J. Ag.*

        3.* Plant 15-20 cm. long, not fimbriate. Tetraspores formed on the midrib of the lamina. W, S, NE .. **V. spiralis** *Lamour.*

    2.* Plant not twisted.

        4. Pinnae opposite or alternate. W ...... **V. intermedia** *J. Ag.*

        4.* Pinnae rarely opposite. W .... **V. cliftonii** *Harv.*

HENNEDYA Harv.

Only species. W, S .... **H. crispa** *Harv.*

PTILONIA J. Ag.

1. Branching dichotomous. S, T .... **P. australasica** *Harv.*

1.* Branching alternate.

    2. Frond smaller, up to 20 cm. long. S, T ...... **P. subulifera** *J. Ag.*

    2.* Frond larger, up to 30 cm. long. T .... **P. intermedia** *Lucas*

CARPOPELTIS Schmitz

1. Plant large, up to 80 cm. long. Branching dichotomous below, alternate-pinnate above. W, S .... **C. elata** (*Harv.*) *Schmitz*

1.* Plant not more than 30 cm. long.

    2. Plant small, up to 7 cm. long, with dentate margins. N .. .. **C. capitellata** (*Sond.*) *Schmitz*

    2.* Plant 20-30 cm. long.

        3. Midrib extending a considerable distance up the thallus; plant less branched and smaller than *C. phyllophora*. W, S .... **C. decipiens** (*Harv.*) *Schmitz*

        3.* Midrib extending a lesser distance up the thallus. W, S, T .... **C. phyllophora** (*Hook. & Harv.*) *Schmitz*

LEPTOPHYLLIS J. Ag.

Only species. S, T .... **L. conferta** (*R. Br.*) *J. Ag.*

HETEROCLADIA Decne.

Only species. W .... **H. australis** *Decne.*

JEANNERETTIA Hook. & Harv.

SYNONYM: *Pollexfenia* Harv.; see Papenfuss (1942).

1. Plant 25-50 cm. long. W, S, T, N .... **J. lobata** *Hook. & Harv.*
1.* Plant less than 12 cm. long when fully developed.
    2. Branching dichotomous to subpinnate.
        3. Margin very undulate; branching dichotomous. S .. .. **J. crispata** (*Zan.*) *Pap.*
        3.* Margin not undulate; branching dichotomous to subpinnate. W, S, T .... **J. pedicellata** (*Harv.*) *Pap.*
    2.* Branching pinnate to palmate.
        4. Branching pinnate. Margins irregularly subcrenate. " Leaves " imbricate at the base. S **J. crenata** (*J. Ag.*) *Pap.*
        4.* Branching palmate. Margins unbroken. Lobes wide. Apices obtuse. S .... **J. nana** (*J. Ag.*) *Pap.*

APOGLOSSUM J. Ag.

1. Plant 1-3 cm. long. " Leaves " 8-12 cm. long by 2-4 mm. wide. W, T .... **A. ruscifolium** (*Turn.*) *J. Ag.*
1.* Plant up to 14 cm. long. " Leaves " up to 5 cm. long by 8 mm. wide. S, T .... **A. tasmanicum** (*F. Muell.*) *J. Ag.*

SYMPODOPHYLLUM Shep. & Wom.

Only species. S .... **S. reinboldii** *Shep. & Wom.*

HYPOGLOSSUM Kuetz.

See page 353.

NEURYMENIA J. Ag.

Only species. W, NE .... **N. fraxinifolia** (*Mert.*) *J. Ag.*

CHAUVINIELLA Pap.

SYNONYM: *Vinassella* D.T.; see Papenfuss (1956).

Only species. Previously recorded as *Chauvinia coriifolia* Harv. W, S .. .. **C. coriifolia** (*Harv.*) *Pap.*

PHITYMOPHORA J. Ag.

Only species. S, T .... **P. imbricata** (*Aresch.*) *J. Ag.*

HEMINEURA Harv.

1. Plant gelatinous, the margins serrulate-undulate. W, S, T.. **H. frondosa** *Harv.*

1.* Plant much less gelatinous, almost cartilaginous, the margins finely dentate. S, T .... **H. wilsonis** *J. Ag.*

CRASSILINGUA Pap.

SYNONYM: *Pachyglossum* J. Ag. 1894, non *Pachyglossum* Decne. (1838). The generic name *Crassilingua* Pap. is accepted, following Papenfuss (1956, p. 160).

It has been suggested (sub *Pachyglossum*) by Papenfuss (1956) that *C. husseyana*, *C. engelhardtii* and *C. prolifera* may in fact all be forms of *C. marginifera* (J. Ag.) Pap. Under *C. prolifera* I am including *Pachyglossum ovale* J. Ag.; see Kylin (1924).

1. Proliferations arising remote from the margins, forming rosettes of "leaves". S .... **C. husseyana** (*J. Ag.*) *May*†

1.* Proliferations arising only from the margins.
  2. Midrib very thick and conspicuous. W .... **C. marginifera** (*J. Ag.*) *May*†
  2.* Midrib not thick and conspicuous.
    3. "Leaves" linear-lanceolate. S **C. engelhardtii** (*J. Ag.*) *May*†
    3.* "Leaves" elliptical-oblong. S .. **C. prolifera** (*J. Ag.*) *May*†

MYRIOGRAMME Kylin

Many species have been recorded as species of *Nitophyllum*.

Myriogramme gunniana possibly includes *Nitophyllum obscurum* J. Ag.; see Lucas (1926).

Nitophyllum serrulatum J. Ag. (now known as *Myriogramme serrulata* (J. Ag.) Kylin), which was recorded with the note " Habit recalling that of *N. pristoideum*, but the ramification is more complex " may be conspecific with, or closely related to, *Myriogramme pristoidea* but, as remarked by Lucas (1926), the geographic and systematic details of this species are not known.

I have effected the combination *Myriogramme perriniae* (see p. 352) following upon the suggestion by Lucas (1931B) that this incompletely known species possibly belongs to this genus.

Harvey erroneously identified specimens of *M. gattyana* as *Nitophyllum multinerve* Hook. & Harv. (now *Myriogramme multinervis* (Hook. & Harv.) Kylin) which name should therefore be deleted from Australian records; see Lucas (1926). The little known *Nitophyllum hymenema* Zan. from Tasmania is possibly conspecific with, or closely related to, *M. gattyana*; see Lucas (1926).

1. Veins not developed in the lamina.
  2. Multifid processes developed on the margins of the lamina. W, S .... **M. erosa** (*Harv.*) *Kylin*
  2.* Not as above.
    3. Margins of thallus bearing small teeth bent alternately upwards and downwards (visible under a lens). S, T .... **M. gunniana** (*Harv.*) *Kylin*
    3.* Not as above; margins of thallus dentate. S, T .... **M. pristoidea** (*Harv.*) *Kylin*

1.* Veins conspicuously developed.
  4. Mid-rib branching alternate. T .... **M. perriniae** (*Lucas*) *May*
  4.* Mid-rib branching dichotomous.
    5. Plant up to 3 cm. long. N .... **M. bombayensis** *Borgs.*
    5.* Plant up to 24 cm. long. S, T .. **M. gattyana** (*J. Ag.*) *Kylin*

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† See page 352.

BRANCHIOGLOSSUM Kylin

Only species. Previously recorded as *Hypoglossum crispatulum* (Harv.) J. Ag. W .... **B. crispatulum** (*Harv.*) *Kylin*

HALICNIDE J. Ag.

Only species. W, T, E, ? S .... **H. similans** *J. Ag.*

HETERODOXIA J. Ag.

Only species. W .... **H. denticulata** (*Harv.*) *J. Ag.*

LEVEILLEA Decne.

Only species. *L. pectinata* Decne. appears to be very closely related. W, E, N .... **L. jungermannioides** (*Mart. & Her.*) *Harv.*

HYMENENA Grev.

The species below have previously been recorded as species of *Nitophyllum*. *N. polyanthum* J. Ag. should probably be included under *Hymenena valida*; see Kylin (1924). Under *H. affinis* I am including *N. caulescens* J. Ag.; see Kylin (1924). *N. parvifolium* J. Ag. should probably be included under *H. multipartita;* see Kylin (1924).

1. Plant markedly caulescent below.
    2. Tetraspore sori in rows between the nerves in the upper segments. Tissue not so thick as in *H. curdeana*, but laminae larger. S, T .... **H. valida** (*J. Ag.*) *Kylin*
    2.* Sori irregularly scattered over the segments. S, T .... **H. curdeana** (*Harv.*) *Kylin*

1.* Plant scarcely or not caulescent below.
    3. Frond fan-shaped. S, T .... **H. affinis** (*Harv.*) *Kylin*
    3.* Frond narrower than in the above. W, S, T .... **H. multipartita** (*Hook. & Harv.*) *Kylin*

CRYPTOPLEURA Kuetz.

Only species. Previously recorded as *Nitophyllum endivaefolium* (Hook. & Harv.) J. Ag. S, T .... **C. endivaefolia** (*Hook. & Harv.*) *Kylin*

BOTRYOGLOSSUM Kuetz.

Only species. Previously recorded as *Rhodoseris cartilaginea* (Harv. & Grev.) Harv. W .... **B. cartilaginea** (*Harv. & Grev.*) *Pap.*

CRYPTONEMIA J. Ag.

Cryptonemia baileyi Holmes was recorded from Queensland by Bailey (1913) and *C. inaequalis* J. Ag. and *C. tenuis* J. Ag. were recorded from Victoria by Wilson (1892), but I have been unable to obtain any further information about them. They were omitted by De Toni (1897-1905).

Only species. Including at least some, probably all, Australian records of *C. luxurians* (Mert.) J. Ag.; see De Toni (1897-1905, p. 1,610). W, S, NE .... **C. undulata** *Sond.*

NITOPHYLLUM Grev.

Nitophyllum fallax J. Ag. from Southern Australia is probably a species of *Dictyota* and hence is omitted; see Kylin (1924). *N. obsoletum* Zan., from Tasmania, is inadequately known. *N. cartilagineum*, *N. pulchellum* and *N. sinuosum* may belong to the genus *Myriogramme*, q.v.

1. Frond thick. W .... **N. cartilagineum** *Harv.*
1.* Frond thinly membranous.
  2. Frond subsessile. Segments linear or cuneate. Plant approximately 7 cm. long. W, S .... **N. pulchellum** *Harv.*
  2.* Frond shortly stipitate.
    3. Segments oblong. Plant up to 22 cm. long. S, T .. .. **N. crispum** (*Kuetz.*) *J. Ag.*
    3.* Segments sublinear. Plant up to 35 cm. long. E .... **N. sinuosum** *Lucas*

PLATYCLINIA J. Ag.

1. Plant imbricate from the base. S .... **P. stipitata** *J. Ag.*
1.* Plant not imbricate from the base.
  2. Width of branch about one half its length. S .. **P. crozieri** *J. Ag.*
  2.* Width of branch less than one half its length.
    3. Margin mostly smooth. S .... **P. purpurea** *J. Ag.*
    3.* Margin mostly dentate. Australia .. **P. crispata** (*J. Ag.*) *D.T.*

CHRYSYMENIA J. Ag.

Chrysymenia coccinea Harv. has been recorded from Tasmania but I have no further information about it. It is doubtful whether *C. concrescens* J. Ag. is in reality a species of *Chrysymenia*; see Kylin (1931). *C. concrescens* has been previously recorded as *Halichrysis concrescens* (J. Ag.) D.T.

1. Plant not manifestly longer than broad. E .... **C. ornata** (*J. Ag.*) *Kylin*
1.* Plant manifestly longer than broad.
  2. Branching mainly dichotomous. E .... **C. digitata** (*Harv.*) *J. Ag.*
  2.* Branching irregularly disposed. E .... **C. concrescens** *J. Ag.*

POLYCOELIA J. Ag.

The inadequately known *P. australis* J. Ag. has been recorded only as from " Australia ".

1. Branching sub-pinnate dichotomous; frond thick, fleshy, purple. S .... **P. chondroides** *J. Ag.*
1.* Branching laciniate to palmatifid, rarely sub-pinnate.
  2. Segments separated by a narrow sinus. T .... **P. fastigiata** *Harv.*
  2.* Segments separated by a wide sinus. W, S, T .. **P. laciniata** *J. Ag.*

MICROGONGRUS J. Ag.

Only species. E .... **M. phyllophoroides** *J. Ag.*

TIAROPHORA J. Ag.

Only species. S .... **T. australis** *J. Ag.*

SYMPHYOCLADIA Falk.

Only species. E, NE .... **S. marchantioides** (*Harv.*) *Falk.*

HALOPHLEGMA Mont.

1. Frond 5-30 cm. long, the segments pinnatifid to secund. Articulations of the filaments 2 to 3 times as long as broad. W, S, T .... **H. preissii** *Sond.*
1.* Frond 4-5 cm. long, lobed. Length of the articulations of the filaments equals the breadth. N .... **H. duperreyi** *Mont.*

HERPOPHYLLUM J. Ag.

Only species. S .... **H. australe** *J. Ag.*

HILDENBRANDTIA Nardo

Hildenbrandtia sp. has been recorded from Australia by Francis (1920).

ACROSORIUM Zan.

The species of *Acrosorium* have been previously recorded as species of *Nitophyllum*.

1. Lateral proliferations produced as a fringe. W, E .... **A. ciliolatum** (*Harv.*) *Kylin*
1.* Lateral proliferations not produced as a fringe.
    2. Hooked branches sometimes developed. S, T, E .... **A. uncinatum** (*J. Ag.*) *Kylin*
    2.* Hooked branches not developed. W, S .. **A. minus** (*Sond.*) *Kylin*

IRIDAEA Bory

Iridaea lubrica Suhr. is too inadequately known for inclusion in the key; it was recorded from Australia without any further indication of locality. Under *I. harveyi* I am including *Rhodoglossum lanceolatum* (Harv.) J. Ag.; see Lucas (1909).

It is difficult satisfactorily to distinguish between the species below on characters mentioned in the inadequate descriptions available. It seems likely that with increased knowledge based on further collections the number of species recognised will be considerably decreased.

1. Thallus about 18 cm. wide. S, T .... **I. gigantea** *J. Ag.*
1.* Thallus up to about 10 cm. wide.
    2. Frond thick to cartilaginous.
        3. Frond linear-lanceolate. T .... **I. purpurea** *J. Ag.*
        3.* Frond cuneate-lanceolate to ovate.

4. Plant up to 14 cm. long, with a cordate base and entire margins. Frond ovate-lanceolate. S, T .... **I. foliifera** *Harv.*
4.* Plant up to 20 cm. long, not adherent to paper. Frond cuneate-lanceolate. S, T .... **I. harveyi** *J. Ag.*
2.* Frond not thick to cartilaginous.
5. Plant over 3 cm. wide, lanceolate, ovate, or elliptical-oblong.
6. Thallus much proliferated and divided. Plant up to 15 cm. long. S, T .... **I. prolifera** (*J. Ag.*) *D.T.*
6.* Thallus mainly entire.
7. Frond lanceolate to ovate, not adhering to paper. Plant up to 50 cms. long. S, T .. **I. australasica** *J. Ag.*
7.* Frond elliptical-oblong. T .... **I. latissima** (*Hook. & Harv.*) *Grun.*
5.* Plant less than 3 cm. wide, adhering to paper. Frond linear-lanceolate. S, T .... **I. polycarpa** *Harv.*

PACHYMENIA J. Ag.

1. Frond up to 9 cm. long. S, T .... **P. apoda** *J. Ag.*
1.* Frond sometimes becoming more than 25 cm. long.
2. Plant prostrate, thick and parchment-like. S .. **P. prostrata** *J. Ag.*
2.* Plant stipitate, the stipes almost terete at the base. S **P. stipitata** *J. Ag.*

EPIPHLOEA J. Ag.

1. " Leaf " sub-cordate at the base, then orbicular-reniform to bullate. W .... **E. bullosa** (*Harv.*) *Schmitz*
1.* " Leaf " elongate-oblong. S .... **E. grandifolia** *J. Ag.*

GLAPHYROMENIA J. Ag.

Only species. S .... **G. pustulosa** *J. Ag.*

CHAETANGIUM Kuetz.

Levring (1953) includes *Chaetangium lingula* Harv. and *C. variolosum* (Mont.) J. Ag. under *C. fastigiatum.*

1. Width of frond variable. W, T .... **C. fastigiatum** (*Bory*) *J. Ag.*
1.* Frond narrow-linear. T .... **C. flabellatum** *Harv.*

MEREDITHIA J. Ag.

1. Frond only slightly divided, sometimes with obtuse teeth on the margin. S .... **M. nana** *J. Ag.*
1.* Frond dichotomous-subpalmatifid, the lobes proliferous from the margins. S, T .... **M. polycoelioides** *J. Ag.*

CALLYMENIA J. Ag.

1. Lamina always perforated. W, S, T .... **C. cribrosa** *Harv.*
1.* Lamina not perforated.
    2. Base below the expanded lamina hard, cylindrical and branched. E .... **C. nitophylloides** *J. Ag.*
    2.* Base less well developed, i.e. the lamina only shortly stipitate.
        3. Plant up to 60 cm. long. S, T, E ...... **C. tasmanica** *Harv.*
        3.* Plant up to 18 cm. long. E ...... **C. brachycystidea** *J. Ag.*

SEBDENIA Berthold

1. Plant branched.
    2. Branching dichotomous to sub-pinnate, pinnate above. Segments linear, 1-1·5 cm. wide. Frond 15-20 cm. long. NE .... **S. ceylanica** (*Harv.*) *Heydr.*
    2.* Branching sub-palmatifid, the divisions further divided. Frond 12-15 cm. N .... **S. maculata** (*J. Ag.*) *D.T.*
1.* Plant broadly expanded, membranous and deeply incised. W, S .. .. **S. kallymenioides** (*Harv.*) *D.T.*

HORMOPHORA J. Ag.

Only species. S .... **H. australasica** *J. Ag.*

PELTASTA J. Ag.

Only species. S .... **P. australis** *J. Ag.*

STICTOSPORUM Harv.

Only species. W, S .... **S. nitophylloides** (*Harv.*) *J. Ag.*

SARCODIA J. Ag.

Under *S. montagneana* I am including *S. palmata* Sond.; see De Toni (1924).

1. Plant with fringed margins. Lord Howe Is. .... **S. ciliata** *Zan.*
1.* Not as above.
    2. Branching fairly regularly dichotomous. Plant smaller. Branches close together. S .... **S. marginata** *J. Ag.*
    2.* Branching irregularly dichotomous. Plant large. Branches distant. S, N .... **S. montagneana** (*Hook. & Harv.*) *J. Ag.*

HALYMENIA Ag.

See page 353.

POLYOPES J. Ag.

Only species. W, S .... **P. constrictus** (*Turn.*) *J. Ag.*

PRIONITIS J. Ag.

1. Whole frond flattened, bearing marginal proliferations. N .. **P. obtusa** *Sond.*

1.* Base of frond terete, the margins without proliferations. W, S, T .. .. **P. microcarpa** (*Ag.*) *J. Ag.*

GELINARIA Sond.

1. Branching densely compound, pinnate, the segments narrow, solid, crowded, numerous, W, S .... **G. harveyana** *J. Ag.*

1.* Branching irregularly pinnatifid, the segments wider, less solid, fewer and less crowded. W .... **G. ulvoides** *Sond.*

BLASTOPHYE J. Ag.

Only species. S .... **B. wilsonii** *J. Ag.*

MARTENSIA Hering.

SYNONYM: *Mesotrema* J. Ag.

Martensia speciosa Zan. has been recorded from Lord Howe Island, but is inadequately known. According to Lucas and Perrin (1947) *M. australis* Harv. and *M. gigas* Harv. are conspecific with *M. elegans*, having been based merely on larger specimens of the same species.

1. Branching repeatedly dichotomous; upper margins toothed or lobed. W, S .... **M. denticulata** *Harv.*

1.* Thallus inconspicuously forked; margins not toothed. W, S, T, E, N .... **M. elegans** *Hering.*

FAUCHEOPSIS Kylin

I have effected the combination *Faucheopsis tasmanica* (see p. 352) following the suggestion by Kylin (1932, p. 29) that *Meristotheca tasmanica* J. Ag. might be more appropriately placed in the genus *Faucheopsis.*

Faucheopsis coronata has also been recorded as *Fauchea coronata* (Harv.) J. Ag.

1. Frond repeatedly dichotomous. S .... **F. coronata** (*Harv.*) *Kylin*

1.* Frond mainly with lateral proliferations. T .... **F. tasmanica** (*J. Ag.*) *May*

ERYTHRYMENIA Schmitz

Erythrymenia meredithiana has been previously recorded as *Halichrysis meredithiana* (J. Ag.) D.T.

1. Plant small (to 6 cm.) consisting of an almost circular " leaf " which is shortly stalked with small proliferations from the axis. S ... **E. minuta** *Kylin*

1.* Plant larger, up to 16 cm. high and 28 cm. wide. T, E .... **E. meredithiana** (*J. Ag.*) *Kylin*

GLOIOPHYLLIS Kuetz.

Gloiophyllis barkeriae has also been recorded as *Grunowiella barkeriae* (Harv.) Schmitz.

1. Plant relatively little divided. Cystocarps scattered over the surface of the larger laciniae. S .... **G. barkeriae** (*Harv.*) *J. Ag.*

1.* Plant more branched than the preceding. Cystocarps produced on the margins of the upper segments. S .... **G. engelhardtii** *Reinb.*

CALLOPHYLLIS Kuetz.

See page 353.

EPYMENIA Kuetz.

Epymenia angustata Sond. from Southern Australia has been excluded from this genus by De Toni (1897-1905).

1. Plant lobed (stipe may be distinct).

  2. Stipe distinct, terete. Thallus not perforated. T, N .... **E. cuneata** (*Harv.*) *J. Ag.*

  2.* Stipe not distinct. Thallus perforated. S, T . . **E. halymenioides** *J. Ag.*

1.* Branches arising from the narrower main axis, with dichotomous lobes in the upper portions.

  3. Evanescent midrib and main axis at times terete. S, T .... **E. membranacea** *Harv.*

  3.* Main axis always flanged. S .... **E. wilsonis** *Sond.*

WOMERSLEYA Pap.

SYNONYM: *Chondrophyllum* Kylin, non Necker.

Only species. Based on *Nitophyllum monanthos* J. Ag. W, S .... **W. monanthos** (*J. Ag.*) *Pap.*

TYLOTUS J. Ag.

Only species. W, S .... **T. obtusatus** (*Sond.*) *J. Ag.*

CALLIBLEPHARIS Kuetz.

Only species. Kylin (1932) showed that this name should replace *Rhodophyllis hypnoides* Harv. S, T .... **C. planicaulis** (*Harv.*) *Kylin*

RHODYMENIA Grev.

Rhodymenia prolificans Zan., from Tasmania, was not mentioned by Kylin (1932) in his comprehensive studies on the Gigartinales; De Toni (1897-1905) suggested that it is closely related to *R. australis.* De Toni (1897-1905) stated that *R. pinnulata* Zan. does not belong to the genus *Rhodymenia.*

1. Branches not imbricate. Plant elongate. S .... **R. stenoglossa** *J. Ag.*

1.* Branches imbricate. Plant not elongate.

- 2. Branches not regularly dichotomous, the apices dilated. S ...... **R. leptophylla** *J. Ag.*
- 2.* Branches regularly dichotomous, the apices not dilated.
  - 3. Stipe prominent, usually thinned above the dichotomy. Thallus narrow. W, S, T ...... **R. linearis** *J. Ag.*
  - 3.* Stipe not prominent, not thinned above the dichotomy.
    - 4. Apices repeatedly proliferating. T .... **R. prolificans** *Zan.*
    - 4.* Apices not repeatedly proliferating.
      - 5. Width of branch moderately uniform. Colour dark. W, S, E ...... **R. australis** (*Sond.*) *Harv.*
      - 5.* Width of branch variable. Colour light. W, S, T ...... **R. foliifera** *Harv.*

CURDIEA Harv.

Curdiea gymnogongroides J. Ag., from Southern Australia, is probably a species of *Melanthalia*; see Kylin (1932). *C. obesa* has been previously recorded as *Sarcocladia obesa* Harv. *C. crateriformis* has been previously recorded as *Sarcocladia crateriformis* J. Ag. Kylin (1932) suggests that *C. meredithiae* may only be a form of *C. laciniata*. The generic name *Curdiea* is accepted following Kylin (1956).

- 1. Thallus moderately uniform in width.
  - 2. Segments fine, less than 1 cm. wide. W .... **C. irvineae** *J. Ag.*
  - 2.* Segments coarse, often several cms. wide.
    - 3. With numerous cylindrical processes up to 5 mm. long (rarely more) issuing from the whole undersurface of the frond. Lord Howe Island .... †**C. rhizophora** (*Lucas*) *May*
    - 3.* Not as above.
      - 4. Branching vaguely sub-pinnate. SW ...... **C. obesa** (*Harv.*) *Kylin*
      - 4.* Lobe formation irregular. E ...... **E. crateriformis** (*J. Ag.*) *Kylin*
- 1.* Thallus variable in width.
  - 5. Branching regularly pinnate. S .... **C. engelhardtii** *J. Ag.*
  - 5.* Branching not regularly pinnate.
    - 6. Sinus rounded, branches imbricate. S **C. kuetzingiana** *J. Ag.*
    - 6.* Sinus and branches not as above.
      - 7. Branching sparce. T .... **C. meredithiae** *J. Ag.*
      - 7.* Branching moderately frequent. S, T, E ...... **C. laciniata** *Harv.*

STENOGRAMMA Harv.

- 1. Fronds wider than those of *S. leptophyllum*. Conceptacles developed in interrupted lines on the midrib. S, T ...... **S. interruptum** (*Ag.*) *Mont.*
- 1.* Fronds narrow-linear. S .... **S. leptophyllum** *J. Ag.*

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† See page 352.

RHODOPHYLLIS Kuetz.

Rhodophyllis volans Harv., from Southern and Southwestern Australia, was not mentioned by Kylin (1932) in his comprehensive studies on the Gigartinales. *R. gunnii* and *R. goodwiniae* can appear similar to *R. ramentacea*.

Papenfuss (1950B) has shown that the name *R. divaricata* should be used in place of *R. bifida* (Good. & Woodw.) Kuetz.

The species below have been recorded previously as species of *Sebdenia*.

1. Secondary branches of the thallus regularly pinnate.
    2. Plant up to 20 cm. long, delicate in texture, the apices blunt. S, T, ? E .... **R. gunnii** *Harv.*
    2.* Plant up to 15 cm. long, coarser in texture, the apices more pointed. S, T .... **R. membranacea** *Harv.*

1.* Secondary branches of the thallus not regularly pinnate.
    3. Branch very variable in width, the apices much finer.
        4. Branches much thinner at their insertion. SW, S .. **R. volans** *Harv.*
        4.* Not as above.
            5. Ultimate branches moderately uniform. S .... **R. ramentacea** (*Ag.*) *J. Ag.*
            5.* Ultimate branches developed by repeated splitting of the preceding branches.
                6. Plant coarse. S, T .... **R. goodwiniae** *J. Ag.*
                6.* Plant fine. W, S .... **R. tenuifolia** (*Harv.*) *J. Ag.*
    3.* Branch moderately uniform in width, the apices approximately the same width. Lateral proliferations sometimes developed.
        7. Margins fringed.
            8. Segments 7 to 12 mm. wide. W, S, NE .... **R. blepharicarpa** *Harv.*
            8.* Segments 2 to 5 mm. wide. S, T ...... **R. membranacea** *Harv.*
        7.* Margins not fringed.
            9. Plant rather membranous, similar to *Rhodymenia* in habit.
                10. Branches not usually thinned at their insertion.
                    11. Apices pointed. Cystocarps developed on the margins. Plant wider. S .... **R. marginalis** *J. Ag.*
                    11.* Apices less acute. Cystocarps not developed on the margins. W .... **R. divaricata** (*Stackh.*) *Pap.*
                10.* Branches thinned at their insertion. SW, S .... **R. brookeana** *J. Ag.*
            9.* Plant not membranous, varying in width from tuft to tuft in the plant. S, T .... **R. multipartita** *Harv.*

LEPTOSOMIA J. Ag.

The species below have been recorded previously as species of *Sebdenia*.

1. Thallus with large and numerous proliferations. W **L. cliftonii** (*Harv.*) *J. Ag.*
1.* Thallus without large and numerous proliferations. S .. **L. gelatinosa** *J. Ag.*

LEPTOFAUCHEA Kylin

Only species. Previously recorded as *Fauchea nitophylloides* J. Ag. E .... **L. nitophylloides** (*J. Ag.*) *Kylin*

BIBLIOGRAPHY

Abbott, Isabella A. and Doty, M. S., (1960).—Studies in the Helminthocladiaceae. 2. *Trichogloeopsis*. Amer. Journ. Bot. XLVII, 632-640.

Anon., (1948).—Notes and Exhibits on an Excursion to the Great Barrier Reef. By Members of Sydney Univ. Biol. Soc. Proc. Linn. Soc. N.S.W. LXXIII, 44.

Bailey, F. M., (1895).—Contributions to the Queensland Flora. Dept. Agric., Bot. Bull, XI, 7-69, pl. 1-17.

Bailey, F. M., (1913).—Comprehensive Catalogue of Queensland Plants. Brisbane.

Borgesen, F., (1930).—Marine Algae from the Canary Islands III. Rhodophyceae 3. Dansk. Vidensk. Selsk., Biol. Meddel. IX, No. 1, 1-159, 60 figs.

Borgesen, F., (1931).—Some Indian Rhodophyceae Especially from the Shores of the Presidency of Bombay. I. Kew Bull. 1-24.

Borgesen, F., (1934).—Some Indian Rhodophyceae Especially from the Shores of the Presidency of Bombay IV. Kew Bull. 1-30.

Borgesen, F., (1942).—Some Marine Algae from Mauritius. III. Rhodophyceae Pt. I. Porphyridiales, Bangiales, Nemalionales. Det. Kgl. Danske Videnskabernes Selskab. Biol. Meddel. XVII, No. 5, 1-64.

Borgesen, F., (1943).—Ditto. Part II. Gelidiales, Cryptonemiales, Gigartinales. Ibid. XIX, No. 1, 1-85, pl. 1.

Chapman, D. J., (1962).—A Check List and Key to the Rhodophyceae of New Zealand. Section A. Bangioideae. Trans. Roy. Soc. N.Z. Bot. n.s. I, 127-137.

Chou, R. C. Y., (1944).—Pacific Species of *Galaxaura*. I. Asexual Types. Mich. Acad. Sci. Arts & Letters, Pap. XXX, 35-55, pl. 1-11.

Chou, R. C. Y., (1945.)—Pacific Species of *Galaxaura*. II. Sexual Types. Mich. Acad. Sci. Arts and Letters, Pap. XXXI, 1-24, pl. 1-13.

Cotton, A. D., (1908).—The New Zealand Species of *Rhodophyllis*. Kew Bull. 97-102.

Cotton, A. D., (1913).—Notes on Queensland Florideae. Kew Bull. 252-5.

Cotton, A. D., (1915).—Cryptograms from the Falkland Islands, collected by Mrs. Vallentin. Journ. Linn. Soc., Bot. XLIII, 137-231, pl. 4-10.

Cribb, A. B., (1954).—Records of Marine Algae from South Eastern Queensland. I. Univ. Qld., Dept. Bot., Pap. III, No. 3, 15-37.

Cribb, A. B., (1956).—Records of Marine Algae from South Eastern Queensland. II. *Polysiphonia and Lophosiphonia*. Univ. Qld., Dept. Bot., Pap. III, No. 16, 131-147.

Cribb. A. B., (1956).—Notes on Marine Algae from Tasmania. Royal Soc. Tas., Pap. and Proc. XC, 183-8.

Cribb, A. B., (1958).—Records of Marine Algae from South Eastern Queensland. III. *Laurencia* Lamx. Univ. Qld., Dept. Bot., Pap. III, No. 19, 159-191.

Cribb, A. B., (1958).—Records of Marine Algae from South Eastern Queensland. IV. *Caulerpa*. Univ. Qld., Dept. Bot., Pap. III, No. 23, 209-220.

Cribb, A. B., (1961).—Some Marine Algae from Thursday Island and Surrounding Areas. Univ. Qld., Dept. Bot., Pap. IV, No. 5, 51-59.

Dawson, E. Yale, (1954).—Notes on Tropical Pacific Marine Algae. Bull. S. Calif. Acad. Sci. LIII, No. 1, 1-7.

Dawson, E. Yale, (1961).—Marine Red Algae of Pacific Mexico. Part 4. Gigartinales. Pac. Nat. II, No. 5-6, 225.

De Toni, J. B., (1897-1905).—Sylloge Algarum. IV, Sect. 1-4. Florideae. Padua.

De Toni, J. B., (1924).—Sylloge Algarum. Vol. VI. Florideae. Padua.

De Toni, J. (1936).—Noterelle di nomenclatura algologica VII. Primo elenco di Floridee omonini. Brescia.

De Toni, J., (1947).—Diagnoses Algarum Novarum. Post Sylloges Editionem Descriptarum. II. Florideae. Centuria 1. Brixiae.

De Toni, J. B., and Forti, Archille, (1923).—Alghe di Australia, Tasmania, e Nouva Zelanda. Mem. Inst. Veneto. di Sci. Lettere ed Arti XXIX, No. 3, 1-183, pl. 1-10. Venezia.

Dickenson, C. I., (1949).—Two Little Known species of *Ballia*, *B. beckeri* Schmitz and *B. hamulosa* Ag. Kew Bull. 29-31.

Doty, M. S. and Abbott, I. A., (1961).—Studies in the Helminthocladiaceae (Rhodophyta). *Helminthocladia.* Pacif. Sci. XV, No. 1, 56-63.

Drew-Baker, K. M., (1956).—The generic names *Goniotrichum* Kuetz. and *Erythrotrichia* Aresch. Phyc. Bull. IV, 13-14.

Falkenberg, P., (1901).—Die Rhodomelaceen des Golfs von Neapel und der angrenzenden Meeres-Abschnitte. Fauna und Flora des Golfes von Neapel Monographie 26, 1-753, 10 figs., 24 pls. Berlin.

Fan, Kung-chu, (1961).—Morphological Studies of the Gelidiales. Univ. Calif. Publ. Bot. XXXII, No. 5, 315-368.

Feldmann, Jean, (1931).—Remarques sur les genres *Gelidium* Lamour., *Gelidiopsis* Schmitz et *Echinocaulon* (Kuetz.) emend. Rec. Trav. Cryptog. dediés à Louis Magin, 151-166, Paris.

Feldmann, J. and Hamel, G., (1934).—Observations sur quelques Gelidiacees. Rev. Gen. Bot. XLVI. Paris.

Francis, W. D., (1920).—The Origin of Black Coatings of Iron and Manganese Oxides on Rocks. Proc. Roy. Soc. Qld. XXXII, No. 8, 110-116, pl. 1.

Gepp, A. and Gepp, E. S., (1906).—Some Marine Algae from New South Wales. Journ. Bot. XLIV, 249-262, pl. 481.

Grunow, A., (1874).—Algen der Fidschen, Tonga- und Samoa-Inseln. Journ. Museum Godeffroy III, 23-50.

Harvey, W. H., (1858-1863).—Phycologia Australica and Synopsis. I-V. London.

Hewitt, F. E., (1960).—A Morphological Study of Three South African Gigartinales. Univ. Calif. Publ. Bot. XXXII, No. 3, 195-234.

Hommersand, Max H., (1963).—The Morphology and Classification of some Ceramiaceae and Rhodomelaceae. Univ. Calif. Publ. Bot. XXXV, No. 2, 165-366, pl. 1-6.

Israelson, G., (1942).—Freshwater Florideae of Sweden; Studies on their Taxonomy, Ecology and Distribution. Sym. Bot. Upps. VI, No. 1, 1-134. Uppsala.

Kjellman, F. R., (1900).—Om Floridé-Slagtet *Galaxaura*, dess Organografi och Systematik. Svenska Vetenskaps Akad. Handlingar XXXIII, No. 1, 1-110, pls. 1-20. Stockholm.

Kuehne, P. E., (1946).—Four Marine Algae from Australia and New Zealand. Lloydia. IX, No. 1, 31-44.

Kylin, Harald, (1912).—Studien uber die Schwedischen Arten der Gattungen *Batrachospermum* Roth und *Sirodotia* nov. gen. Nov. Act. Reg. Soc. Sci. Uppsaliensis, Ser. 4, III, No. 3, 1-40.

Kylin, Harald, (1924).—Studien uber die Delesseriaceen. Lunds Univ. Årsskrift, N.F. Avd. 2, XX, No. 6, 3-111, taf. 1-80.

Kylin, Harald, (1925).—The Marine Red Algae in the Vicinity of the Biological Station at Friday Harbor, Washington. Lunds. Univ. Årsskr. N.F. Avd. 2, XXI, No. 9, 1-87.

Kylin, Harald, (1931).—Die Florideenordnung Rhodymeniales. Lunds. Univ. Årsskrift, N.F. Avd. 2, XXVII, No. 11, 1-48, taf. 1-20.

Kylin, Harald, (1932).—Die Florideenordnung Gigartinales. Lunds. Univ. Årsskrift, N.F. Avd. 2, XXVIII, No. 8, 1-88, taf. 1-28.

Kylin, Harald, (1938).—Verzeichnis einiger Rhodophyceen von Sud-Afrika. Lunds. Univ. Årsskrift. N.F. 2, XXXIV, No. 8, 1-26, pl. 1-8.

Kylin, Harald, (1941).—Californische Rhodophyceen. Lunds. Univ. Årsskrift, N.F. Avd. 2, XXXVII, No. 2, 1-51, taf. 1-13.

Kylin, Harald, (1944).—Die Rhodophyceen der Schwedischen Westkust. Lunds. Univ. Årsskrift, N.F. Avd. 2, XL, No. 2, 1-104, taf. 1-32.

Kylin, Harald, (1956).—Die Gattungen der Rhodophyceen. Gleerup, Lund., Sweden.

Levring, Tore, (1941).—Die Meeresalgen der Juan Fernandez-Inseln. Nat. Hist. Juan Fernandez and Easter Island, 601-669, pl. 49-53. Ed. Carl Skottsberg. Uppsala.

Levring, Tore, (1945).—Marine Algae from Some Antarctic and Subantarctic Islands. Lund. Univ. Årsskrift, N.F. Avd. 2, XLI, No. 7, 1-36, pl. 1.

Levring, Tore, (1946).—A list of Marine Algae from Australia and Tasmania. Meddelanden Goteborgs Bot. Tradgard XVI, 215-227.

Levring, Tore, (1953).—The Marine Algae of Australia. I. Rhodophyta. Goniotrichales, Bangiales and Nemalionales. Arkiv for Botanik. Ser. 2, II, No. 6, 457-530.

Levring, Tore, (1956).—Contributions to the Marine Algae of New Zealand. I. Rhodophyta. Goniotrichales, Bangiales, Nemalionales and Bonnemaisoniales. Arkiv for Botanik. II, No. 5, 407-432.

Lindauer, V. W. and Setchell, W. A., (1946).—Note on a New Species of Red Alga, *Lenormandia coronata*. Trans. Roy. Soc. N.Z. LXXVI, No. 1, 66-67, pl. 1.

Lucas, A. H. S., (1909).—Revised list of the Fucoidae and Florideae of Australia. Proc. Linn. Soc. N.S.W. XXXIV, No. 1, 8-60.

Lucas, A. H. S., (1912).—Supplementary List of the Marine Algae of Australia. Proc. Linn. Soc. N.S.W. XXXVII, No. 1, 157-171.

Lucas, A. H. S., (1913).—Notes on Australian Marine Algae. I. Proc. Linn. Soc. N.S.W. XXXVIII, No. 1, 49-60.

Lucas, A. H. S., (1914).—Marine Algae. Brit. Ass. Adv. Sci., Handbook for N.S.W., 459-463.

Lucas, A. H. S., (1919).—Notes on Australian Marine Algae. II. Descriptions of four new species. Proc. Linn. Soc. N.S.W., XLIV, No. 1, 174-179.

Lucas, A. H. S., (1926).—Notes on Australian Marine Algae. III. The Australian Species of the Genus *Nitophyllum*. Proc. Linn. Soc. N.S.W. LI, No. 4, 594-607, pl. 37-45.

Lucas, A. H. S., (1927).—Notes on Australian Marine Algae. IV. The Australian Species of the Genus *Spongoclonium*. Proc. Linn. Soc. N.S.W. LII, No. 4, 460-470, pl. 27-35.

Lucas, A. H. S., (1927).—Notes on Australian Marine Algae. V. Proc. Linn. Soc. N.S.W. LII, No. 4, 555-562, pl. 41-48.

Lucas, A. H. S., (1928).—The Marine Algae of Tasmania. Pap. & Proc. Roy. Soc. Tas., 6-30.

Lucas, A. H. S., (1931A.).—The Marine Algae Hitherto Recorded from North-East Australia. Rep. Great Barrier Reef Committee. III. Brisbane. 47-57.

Lucas, A. H. S., (1931B).—Notes on Australian Marine Algae. VI. Description of Six New Species. Proc. Linn. Soc. N.S.W. LVI, No. 5, 407-411, pl. 23-27.

Lucas, A. H. S., (1934).—Notes on Australian Marine Algae. VII. The Algae of the Low Islands. Proc. Linn. Soc. N.S.W. LIX, No. 5-6, 348-350.

Lucas, A. H. S., (1935.)—The Marine Algae of Lord Howe Island. Proc. Linn. Soc. N.S.W. LX, No. 3-4, 194-231, pl. 5-9.

Lucas, A. H. S. and Perrin, F., (1947).—The Seaweeds of South Australia. Pt. II. The Red Seaweeds. Handbook of the Flora and Fauna of South Australia. 111-458. Adelaide.

Manza, A. V., (1940).—A Revision of the Genera of Articulated Corallines. Philippine Journ. Sci. LXXI, 239-316, pl. 1-20.

Mason, Lucile R., (1953).—The Crustaceous Coralline Algae of the Pacific Coast of the United States and Canada and Alaska. Univ. Calif. Publ. Bot. XXVI, No. 4, 313-390, pl. 27-46.

May, Valerie, (1938).—A Key to the Marine Algae of N.S.W. Pt. I. Chlorophyceae. Proc. Linn. Soc. N.S.W. LXIII, 207-218.

May, Valerie, (1939).—A Key to the Marine Algae of N.S.W. Pt. II. Melanophyceae (Phaeophyceae). Proc. Linn. Soc. N.S.W. LXIV, 191-215.

May, Valerie, (1940).—Notes and Exhibits. Proc. Linn. Soc. N.S.W. LXV, No. 1-2, xxx-xxxi.

May, Valerie, (1944).—Studies on Australian Marine Algae. I. The Corrected Name for *Pterocladia pectinata* (A. and E. S. Gepp) Lucas. Proc. Linn. Soc. N.S.W. LXIX, No. 5-6, 226-228.

May, Valerie, (1945).—Studies on Australian Marine Algae. II. Notes Extending the Known Geographical Range of Certain Species. Proc. Linn. Soc. N.S.W. LXX, No. 3-4, 121-124.

May, Valerie, (1946).—Studies on Australian Marine Algae. III. Geographical Records of Various Species and Observations on *Acrochaetium botryocarpum* (Harv.) J. Ag. and *Pterocladia capillacea* (Gmel.) Born. and Thur. Proc. Linn. Soc. N.S.W. LXXI, No. 5-6, 273-277, pl. 19.

May, Valerie, (1948A).—Studies on Australian Marine Algae. IV. Further Geographical Records. Proc. Linn. Soc. N.S.W. LXXIII, No. 5-6, 293-297.

May, Valerie, (1948B).—The Algal Genus *Gracilaria* in Australia. Commonwealth of Australia, C.S.I.R., Bull. No. 235, 1-63, pl. 1-15.

May, Valerie, (1949).—Studies on Australian Marine Algae. V. Observations on and Geographical Records of Various Species, Particularly Those of the *Gelidium* Complex. Proc. Linn. Soc. N.S.W. LXXIV, No. 3-4, 196-202.

May, Valerie, (1951).—Studies on Australian Marine Algae. VI. New Geographical Records of Certain Species. Proc. Linn. Soc. N.S.W. LXXVI, No. 3-4, 84-87.

May, Valerie, (1951).—The Marine Algae of Brampton Island, Great Barrier Reef, off Mackay, Queensland. Proc. Linn. Soc. N.S.W. LXXVI, No. 3-4, 88-104.

May, Valerie, (1953).—A Key to the Genera of Rhodophyceae (Red Algae) Hitherto Recorded from Australia. Contrib. N.S.W. Nat. Herb. II, No. 1, 13-37.

May, Valerie, (1965).—Supplement to the Key to the Genera of Rhodophyceae (Red Algae) Hitherto Recorded from Australia. Contrib. N.S.W. Nat. Herb. III, No. 6, 341-348.

Moore, L. B., (1945).—The Genus *Pterocladia* in New Zealand. Trans. Roy. Soc. N.Z. LXXIV, 332-342.

Newton, Lily, (1931).—Handbook of the British Seaweeds, London.

Okamura, K., (1904).—List of Marine Algae Collected in Caroline Islands and Australia. Bot. Mag. Tokyo XVIII, 77-96.

Okamura, K., (1907-1937).—Icones of Japanese Algae. I-VIII. Tokyo.

Okamura, K., (1934).—On *Gelidium* and *Pterocladia* of Japan. Journ. Imp. Fish. Inst., Tokyo XXIX, 45-67.

Papenfuss, George F., (1940).—Notes on South African Marine Algae. I. Bot. Notiser, 200-226. Lund.

Papenfuss, George F., (1942).—Notes on Algal Nomenclature. I. *Pollexfenia, Jeannerettia* and *Mesotrema.* Proc. Nat. Acad. Sci. XXVIII, No. 10, 446-451.

Papenfuss, George F., (1944).—Notes on Algal Nomenclature. III. Miscellaneous Species of Chlorophyceae, Phaeophyceae and Rhodophyceae. Farlowia I, No. 3, 337-346.

Papenfuss, George F., (1944).—Structure and Taxonomy of *Taenioma*, Including a Discussion on the Phylogeny of the Ceramiales. Madroño VII, No. 7, 193-214.

Papenfuss, George F., (1945).—Review of the *Acrochaetium-Rhodochorton* Complex of the Red Algae. Univ. Calif. Publ. Bot. XVIII, No. 14, 299-334.

Papenfuss, George F., (1946).—Structure and Reproduction of *Trichogloea requienii*, with a Comparison of the Genera of Helminthocladiaceae. Bull. Torrey Bot. Club LXXIII, No. 5, 419-437.

Papenfuss, George F., (1947).—Further Contributions toward an Understanding of the *Acrochaetium - Rhodochorton* Complex of the Red Algae. Univ. Calif. Publ. Bot. XVIII, No. 19, 433-447.

Papenfuss, George F., (1947).—Generic Names of Algae Proposed for Conservation. I. Madroño IX, No. 1, 8-17.

Papenfuss, George F., (1950A).—Generic Names of Algae Proposed for Conservation. II. Madroño X, No. 6, 179-184.

Papenfuss, George F., (1950B).—Review of the Genera of Algae Described by Stackhouse. Acta Hydrobiologica, Limn. et Protist. II, No. 3, 181-208.

Papenfuss, George F., (1951).—Notes on South African Marine Algae. III. Journ. S. Afr. Bot. XVII, 167-188.

Papenfuss, George F., (1956).—On the Nomenclature of some Delesseriaceae. Taxon V, No. 7, 158-162.

Papenfuss, George F., (1958).—Notes on Algal Nomenclature. IV. Various Genera and Species of Chlorophyceae, Phaeophyceae and Rhodophyceae. Taxon VII, No. 4, 104-109.

Papenfuss, George F., (1958).—Die Gattungen der Rhodophyceen. By Harold Kylin. Gleerup, Lund. Sweden xv + 673 pp., 458 figs., 1956. Bull. Torrey Bot. Club LXXXV, No. 2, 142-143.

Post, Erika, (1936).—Systematische und Planzengeographische Notizen zur *Bostrychia-Caloglossa*-Association. Rev. Algol. IX, 1-84.

Post, Erika, (1939).—Weitere Daten zur Verbreitung des Bostrichetum. III. Archiv. Protistenk. XCIII, 6-37.

Post, Erika, (1961).—*Bostrychia flagellifera* Post in Japan; a Synoptic Study. Bull. Research Council of Israel. Sec. D. Bot. 10D, 101-115.

Setchell, W., (1912).—Algae Novae et Minus Cognitae. I. Univ. Calif. Publ. Bot. IV, 229-263, pl. 25-31.

Setchell, W., (1914).—The *Scinaia* Assemblage. Univ. Calif. Publ. Bot. VI, No. 5, 79-152, pl. 10-16.

Setchell, W., (1943).—*Mastophora* and the Mastophoreae; Genus and Subfamily of Corallinaceae. Proc. Nat. Acad. Sci. XXIX, 127-136.

Setchell, W., and Gardner, N. L., (1933).—A Preliminary Survey of *Gigartina*, with Special Reference to Its Pacific North American Species. Univ. Calif. Publ. Bot. XVII, 255-340, pl. 46-65.

Setchell, W., and Gardner, N. L., (1937).—A Preliminary Report of the Algae of the Templeton Crocker Expedition. Proc. Calif. Acad. of Sci., 4th Ser., XXII, No. 2, 65-98, pl. 3-25.

Shepley, E. Ann, and Womersley, H. B. S., (1960).—*Sympodophyllum*, a New Genus of Delesseriaceae, Rhodophyta, from South Australia. Nova Hedwigia IV, No. 3-4, 383-388.

Silva, Paul C., (1950).—Generic Names of Algae Proposed for Conservation. Hydrobiologia II, No. 3, 252-280.

Silva, Paul C., (1952).—A Review of Nomenclatural Conservation in the Algae from the Point of View of the Type Method. Univ. Calif. Publ. Bot. XXV, No. 4, 241-324.

Silva, Paul C., (1957).—Remarks on Algal Nomenclature. Taxon VI, No. 5, 141-145.

Skuja, H., (1931).—Untersuchungen uber die Rhodophyceen des Süsswassers. Archiv. fur Protistenk. LXXIV, 297-309.

Skuja, H., (1933).—Untersuchungen uber die Rhodophyceen des Süsswassers. III. *Batrachospermum Breutelii* Rbh. und seine Bretkorper. Archiv. fur Protistenk. LXXX, 357-366.

Skuja, H., (1934).—Untersuchungen uber die Rhodophyceen des Süsswassers. Pt. 4-6. Beiheft. bot. Centralbl., LII, B, Dresden.

Smith, G. M., (1944).—Marine Algae from the Monteray Peninsula. Stanford Univ.

Sonder, W., (1871).—Die Algen des Tropischen Australiens. Hamburg.

Sonder, W., (1880).—Algae Australianae Hactenus Cognitae, u. Algae e Manuscriptis Praecipue. Ferdinand von Mueller, Fragmenta Phytographiae Australiae XI, 1-42 and 105-107.

Stoloff, Leonard, (1962).—Algal Classification—An Aid to Improved Industrial Utilization. Econ. Bot. XVI, No. 2, 86-94.

Svedelius, N., (1945).—Critical Notes on some Species of *Galaxaura* from Ceylon. Arkiv. for Bot. XXXIIA, No. 6, 1-74, pl. 1-9.

Svedelius, N., (1953).—Critical Studies on Some Species of *Galaxaura* from Hawaii. Nova Acta Regiae Soc. Upsal., Ser. 1, XV, No. 9, 1-92.

Tanaka, Takesi, (1941).—The Genus *Hypnea* from Japan. Hokkaido Imp. Univ. Sci. Pap. Inst. Algol. Res. Fac. Sci. II, No. 2, 227-250, pl. 53-4.

Taylor, W. R., (1937).—Marine Algae of the North-Eastern Coast of North America. Ann. Arbor, Univ. Mich. Studies Sci., Ser. 13, 1-427, 60 pl.

Tokida, Jun and Tadaaki, Inaba, (1950).—Contributions to the Knowledge of the Pacific Species of *Antithamnion* and Related Algae. Pac. Sci. IV, No. 2, 118-134.

Tseng, C. K., (1942A).—Marine Algae of Hong Kong. II. The Genus *Catenella*. Journ. Wash. Acad. Sci. XXXII, No. 5, 142-146.

Tseng, C. K., (1942B).—Marine Algae of Hong Kong. III. The Genus *Bostrychia*. Mich. Acad. Sci. Arts and Letters, Paps. XXVIII, 165-183, pl. 1-3.

Tseng, C. K., (1944).—Notes on the Algal Genus *Taenioma*. Madroño VII, No. 7, 215-226.

Weber van Bosse, A., (1928).—Liste des Algues du Siboga. IV. Rhodophyceae. 3rd. part. Gigartinales et Rhodymeniales. Siboga Expedition, Monogr. LIX, 393-533. Leiden.

Weber Van Bosse, A., and Foslie, M. (1904).—Corallinae Verae of the Malay Archipelago. Siboga Expedition, Monogr. LXI, 78-110. Leiden.

Wilson, J. Bracebridge, (1892).—Catalogue of Algae Collected at or near Pt. Phillip Heads and Western Port. Proc. Roy. Soc. Vic. n.s. IV, 157-190.

Womersley, H. B. S., (1946).—Studies on the Marine Algae of Southern Australia. No. 2. A New Species of *Dasyopsis* (Family Dasyaceae) from Kangaroo Island. Trans. Roy. Soc. S. Austral. LXX, No. 2, 137-144, pl. 27.

Womersley, H. B. S., (1950).—The Marine Algae of Kangaroo Island. III. List of Species. Trans. Roy. Soc. S. Austral. LXXIII, 137-197.

Womersley, H. B. S., (1956).—A Critical Survey of the Marine Algae of South Australia. I. Chlorophyta. Austral. Journ. Mar. Freshw. Res. VII, No. 3, 343-383.

Womersley, H. B. S., (1958).—Marine Algae from Arnhem Land, Northern Territory, North Australia. Records Amer.-Austral. Sci. Exp. to Arnhem Land III, 139-161.

Womersley, H. B. S., and Shepley, E. Ann, (1959).—Studies on the *Sarcomenia* Group of the Rhodophyta. Austral. Journ. Bot. VII, 168-223, pl. 1-5.

Yamada, Y., (1938).—The Species of *Liagora* from Japan. Hokkaido Imp. Univ. Sci. Pap. Inst. Algol. Res. Fac. Sci. II, 1-34.

Yamada, Y., (1944).—A List of the Marine Algae from the Atoll of Ant. Hokkaido Imp. Univ. Sci. Pap. Inst. Algol. Res. Fac. Sci. III, No. 1, 31-45.

Zanardini, J., (1874).—Phyceae Australicae Novae vel Minis Cognitae. Flora LVII, 486-505.

Zeh, W., (1912).—Neue Arten der Gattung *Liagora*. Notizblatt d. Kgl. Bot. Garten u. Mus. Berlin-Dahlem V, 268-273.

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ERRATA

Page 32, in the 1st line sub **Scleranthus,** for "*S. annus*" read "*S. annuus*".

,, 34, in the 5th line sub **Rorippa,** for "*R. nasturtium-acquaticum*" read "*R. nasturtium-aquaticum*".

,, 97, in the 11th line sub **Rorippa,** for "*Nasturtim*" read "*Nasturtium*".

,, 182, line 11, for "*Euphorbia heliscopia*" read "*Euphorbia helioscopia*".

,, 183, line 3, for "*Genista monspessulara*" read "*Genista monspessulana*".

,, 185, line 8, for "*Ligistrum*" read "*Ligustrum*".

Plate III (opposite page 216), add to caption "All female inflorescences.".

,, IV, add to caption "All female inflorescences.".

Page 223, in the 4th paragraph, line 4, after *L. valliculae* J. M. Black, insert "*L. muirii* F. Muell.", and in line 6, delete "*L. muirii* F. Muell.".

,, 236, in the 1st paragraph, line 4, for "meiosis" read "mitosis", and for "*secunda*" read "*moorei*".

,, 241, in the 2nd paragraph, line 1, for "Section *Juncus*" read "Section *Genuini*".

,, 243, in the last paragraph, line 2, for "*Juncus*" read "*Genuini*".

,, 283, line 36, for "63" read "62".

,, 286, line 20, for "*Ceniti-*" read "*Ctenitis*", and at the end of line 21, delete the misplaced "*s*".

,, 304, line 31, for "south-west China" read "south-east China".

,, 338, in the 4th last line, for "*Dryopteri snigritiana*" read "*Dryopteris nigritiana*".

,, 339, in the last paragraph, line 10, for "where" read "which".

,, 341, in the 7th last line, for "*Coloconema*" read "*Colaconema*".

,, 344, line 7, for **"Coloconema"** read **"Colaconema".**

,, 344, in the 5th last line of text, for "88.*" read "89.*".

,, 346, in the 3rd last line of footnote, for "*Ardissonia*" read "*Ardissonea*".

,, 385, in the 1st line sub **Neoardissonia,** for "*Ardissonia*" read "*Ardissonea*".

,, 400, in the 4th line sub **Crassilingua,** for "*C. marginifera* (J. Ag.) Pap." read "*C. marginifera* (J. Ag.) May".

,, 416, line 19, for Weber Van Bosse" read "Weber van Bosse".

,, 422, line 10, for "*Gloiophloea* (J. Ag.)" read "*Gloiophloea* J. Ag.".

,, 425, line 4, for "*Mychodia*" read "*Mychodea*".

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